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FOREST SERVICE

1970-71

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United States Department of Agriculture

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U.S. Department of Agriculture,
Forest Service,
Washington, D.C., April 3, 1972.

Hon. Earl L. Butz
Secretary of Agriculture

Dear Mr. Secretary:

The major activities and accomplishments of the Forest Service in providing for conservation and wise use of our Nation's forest and related resources are here summarized for the years 1970 and 1971.

Throughout our history, the public and private forest lands which cover approximately one-third of our country's land area have provided a resource base for the growth and development of our Nation. From these lands have come the lumber and plywood to build America's homes, and the wood material that is transformed into countless products to meet the needs of an expanding population.

These same lands have helped to meet ever-growing public demands for outdoor recreation, for watershed management to meet the needs of agriculture, industry, and our cities, for favorable habitats for fish and wildlife, and for forage to feed both livestock and wildlife.

This report emphasizes that as our forest and related lands continue to provide large quantities of a broad range of goods and service, added dimension is being applied to the protection and enhancement of the forest environment and to efforts to achieve greater management balance in meeting the varied needs of the public.

The basis for this performance is clearly outlined in Forest Service objectives and policy guides contained in "Framework for the Future," issued in February of 1970. The advances made during the 2 years covered by this report reflect the Department's leadership and support in helping to meet the material, environmental, social, and economic needs of the American people.

Edward P. Cliff

Edward P. Cliff
Chief, Forest Service.

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This report covers calendar year activities unless otherwise identified. Records on a fiscal year basis are so reported. Mention of commercial companies, products, or services is solely for necessary historical identification and implies no endorsement by the Department.

Issued April 1972

The Forest Service, U.S. Department of Agriculture, is dedicated to the principle of multiple-use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

Programs and activities of the U.S. Department of Agriculture are available to all persons regardless of race, color, creed, sex, or national origin.

Forests in the Service of Man

America rediscovered its natural environment with the opening of the decade of the 1970's. Public interest and public concern for the quality of the environment has made such terms as "ecological balance" and "environmental enhancement," common subjects for discussion and debate in press, radio, and television. This surge of environmental concern was dramatically expressed when on April 22, 1970—"Earth Day"—millions of Americans across the country took part in meetings, debates, demonstrations, and teach-ins to focus attention on the need to "do something" about the declining state of our environment.

Conservation and environmental organizations, some new and some of long standing, have been quick to capitalize on this keen public interest and have taken the cause of environmental protection to a receptive news media and to legislative bodies at local, State, and national levels.

The word "environment" means many things to many people for it relates to the total world in which we live, and all the things and all the forces that affect us—social, economic, religious, political, and physical. Taken together, they are a measure of the quality of life. However, the newly expressed environmental concern has been directed primarily at the need to improve the quality of our physical environment—air, water, land, and natural resources.

The deep interest and involvement of the public has resulted in passage of many environmental laws, and in refinement of land management policies directed at maintaining or improving the natural environment. Evidence that this interest continues to be strong is illustrated by the fact that in the first session of the 92d Congress over 3,000 bills or one-fifth of all bills introduced during that session involved the environment. Approximately 1,600 of these bills related to forestry in some way. The news media continue to devote a great amount of time and space to environmental issues.

The Forest Service of the Department of Agriculture as one of the Nation's oldest conservation agencies and manager of 187 million acres of public lands, has welcomed the new public interest in the environment and has sought greater public involvement in planning and developing programs in forest land management. But few of today's new environmentalists seem to be aware of the long history and continuity of America's efforts to conserve its natural resources.

Gifford Pinchot, the first Chief of the Forest Service, led the original conservation movement in America which in 1905 resulted in establishment of the National Forest System and the development of a management concept based on conservation and wise use of our natural resources. Through the years the Forest Service developed this concept into the principal of multiple use sustained yield—the management policy which for almost 70 years has provided goods and services to help sustain and develop our Nation with the assurance that our forest resources would continue to serve the needs of future generations. The wilderness concept had its beginning with Forest Service men like Aldo Leopold and Robert Marshall. Thus, it was the Forest Service that first developed and applied the concept of wilderness with the establishment of the Gila Primitive Area in New Mexico in 1924. From that year until the passage of the Wilderness Act in 1964, the Forest Service set aside over 14 million acres of National Forest lands for wilderness protection.

Today 10 million acres of these lands are in the National Wilderness Preservation System, comprising about 98 percent of the entire System. The other primitive areas previously set aside by the Forest Service are being studied for possible additions to the Wilderness System. A review is presently being made of all undeveloped lands in our National Forests to identify those additional areas which may be considered for further study as wilderness as well as to identify the presently undeveloped land which should be managed for a broader spectrum of multiple uses.

In the East many forested areas were developed and exploited under private ownership. Few pub-

lic lands were available to come under National Forest management. In 1911, Congress authorized purchase under the Weeks Law of those forest lands needed for the protection of the flow of navigable streams. Under National Forest management most of these lands, which were heavily cut and burned over in early times, have again become productive and beautiful forests.

The new public concern for the environment has seen some environmentalist organizations and some segments of the news media severely criticize the Forest Service for its purported lack of consideration for environmental factors. The Forest Service has been responsive to legitimate criticism and has taken action to correct errors that have been made. But much of the criticism has come from well meaning public spirited citizens, concerned about their environment but poorly informed on the science and the complexities of natural resource management.

The scientific nature of natural resource management is in the realm of the silviculturist, the hydrologist, the pathologist, the forester (the Nation's first ecologists), and many other professional scientific disciplines. Men of these professions know the facts of "cause and effect" in treatment of forested lands. Too often today well meaning laymen with a personal "cause" are stating "facts" based on emotion rather than on science. When inadvertently picked up and broadcast by the news media such statements have confused and clouded vital environmental issues and made reasonable decisions extremely difficult.

Superimposed over the scientific aspects of natural resource management are the social, economic, and political realities that have tremendous impact on resource management decisions. Here the crusade for environmental protection is sometimes adulterated and becomes in reality a reflection of the specific desires of a special interest group. Thus, the cause of environmental quality becomes instead a drive for a special use as opposed to other uses.

While wilderness is a highly valued and legitimate use of our National Forests, review of future areas for wilderness classification must fully consider the impact of this designation upon other resource values. With various segments of the public demanding increased facilities for camping, skiing, and other outdoor recreation activities, more timber for housing, better managed watersheds, and more forage for livestock and big game animals, each area which is withdrawn from multiple-use management means a greater concentration of development on the remaining lands to meet other demands of society.

For the most part the current controversy over forest land managemennt revolves around problems of program balance rather than environmental quality. The Forest Service is meeting its responsibilities in environmental protection at all possible speed through modification of procedures, policy direction, and increased environmental research. The material that follows in this report attests to some of the progress being made. The Multiple-Use/Sustained-yield Act directs the Forest Service to manage the National Forest for outdoor recreation (including wilderness), range, timber, watershed, and wildlife and fish purposes. Within these broad areas are a great variety of specific uses that reflect the needs and desires of our complex society.

The social, economic, and political considerations that to a large extent determine the relative degree of program balance among various uses affect the vital interests and the emotions of all Americans. In an effort to achieve the best possible program mix within environmentally sound land and resource management principles, the Forest Service is placing a much greater degree of emphasis on informing and involving the American public in program planning and development.

To this end, in February of 1970, the Forest Service issued its objectives and policy guides in a publication titled, "Framework for the Future." Because of the broad scope of the framework outline, this report, covering some of the major Forest Service accomplishments for 1970 and 1971, has been patterned to follow the outline. Accomplishments are listed under the respective policy statements.

Protect and Improve the Quality of Air, Water, Soil, and Natural Beauty

- **Demonstrate high standards of management throughout the National Forest System. Recreation and range uses, timber harvesting, road construction, and other resource development and use activities are to be conducted so as to protect and improve land and resource quality and productivity.**

National Environmental Policy Act

January 1, 1970, President Nixon signed the National Environmental Policy Act (Public Law 91–190). The purposes of this historic Act are:

—To declare a national policy which will encourage production and enjoyable harmony between man and his environment;

—To promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man;

—To enrich the understanding of the ecological systems and natural resources important to the Nation; and

—To establish a Council on Environmental Quality.

Since practically all Forest Service management activities relate directly or indirectly to the environment, this Act supplemented and strengthened historic conservation efforts. However, in keeping with intent of the Act, the Forest Service now has focused even more attention on environmental situations and is analyzing and studying the ecological consequences of its various activities more thoroughly.

Certain other actions by the administration during 1970 and 1971 emphasized that maintenance of environmental quality was to be a prime consideration by all agencies concerned with management of natural resources. This guideline applies particularly to the Forest Service. Actions taken by the administration included:

1. *President's statement on June 19, 1970*, commenting on findings and recommendations of a Task Force on Softwood, Lumber, and Plywood. This statement called attention to the need for increased timber supplies to meet national housing and other demands. The President directed, in part, that action be taken to improve the level and quality of management on the National Forests to permit increased harvests of softwood timber, consistent with sustained yield, environmental quality, and multiple-use objectives. He also directed that programs be designed to increase production and harvest of timber on State and private lands, consistent with maintaining environmental quality.

2. *Environmental quality message of August 10, 1970.* In this statement, the President challenged research to provide new knowledge about ecological relationships and human behavior in relation to environmental factors. In addition, the President called for new perceptions and attitudes and expressed his intention that environmental considerations will be taken into account at the earliest possible stage of the decision-making process.

3. *Section 102(2)(c) of the National Environmental Policy Act.* This section requires responsible officials to prepare a detailed environmental impact statement for every recomendation or report on proposals for legislation and other major Federal Actions significantly affecting the quality of the human environment. The Act requires the responsible official to consult with and obtain the comments of any federal agency which has jurisdiction by law or special expertise with respect to any environmental impacts involved. It further provides that copies of statements and comments and views of the appropriate Federal, State, and local agencies which are authorized to develop and enforce environmental standards shall be made available to the Council on Environmental Quality (CEQ) and the public.

4. *Subsequent Executive Orders, CEQ Guidelines, OMB Bulletins, Secretary's Memoranda, and Forest Service directives defining and implementing the requirements of the National Environmental Policy Act.* The Forest Service has developed a detailed system for the preparation and review of statements for section 102 and refinements are continuing to be made.

Program Prepared

Thus, it became a first order of business for the Forest Service to help chart a future course which

reflects proper concern for its stewardship of much of the Nation's forest and related lands. One of the objectives in this effort will be to improve the balance among the three major areas of Forest Service responsibility—National Forest Administration, Forestry Research, and State and Private Land Cooperative programs—and among the programs and activities within these major areas.

With these considerations in mind, the Forest Service developed an initial comprehensive statement outlining a tentative "Forestry Program for the Future," proposing specific projects for a 10-year period. The statement is being reviewed further and will be submitted for Departmental consideration.

Progress Cited

Insofar as Forest Service activities are concerned, the National Environmental Policy Act (NEPA) is an extension of the Multiple Use Act and Organic Acts. NEPA makes environmental considerations full partners with economic and technical matters. NEPA has had its greatest effect on Forest Service activities in two principal ways:

1. It further formalizes and extends public involvement and relationships with the Federal, State, and local agencies. NEPA has given a new dimension to citizen participation and citizen's rights.

2. The process requires a wider and more vigorous exploration of alternatives that might avoid some or all of the adverse environmental effects of forest land management opportunities.

The part of NEPA one hears mentioned frequently is the "action-forcing mechanism—the environmental statement." To date the Forest Service has filed statements with the Council on Environmental Quality on 46 major environmental actions. Both draft and final statements have been filed for many of these actions. Statements have been filed on a variety of proposed actions, i.e., timber cutting practices, wilderness proposals, national recreation areas, pesticides, powerlines, unit plans (multiple-use), timber management plans, mining regulations, and other actions. The Forest Service has received and commented on over 700 other Federal agency environmental statements, and has actively participated with other agencies in preparation of statements on such environmental situations as phosphate lease applications, oil and gas lease applications, and highway construction projects.

In the past 2 years many Forest Service people assisted in development of manual directives on preparing environmental statements. These procedures have been working satisfactorily and have been generally praised by the Council on Environmental Quality (CEQ), Environmental Protection Agency (EPA), and General Accounting Office (GAO).

During 1971 the quality of analyses and environmental statements has improved. The Forest Service continues to work closely with CEQ, EPA, and other Federal agencies in carrying out the purposes of the Act.

Monongahela Statement

The Environmental Statement of Timber Management Practices on the Monongahela National Forest in West Virginia merits special consideration. Completed in 1970, it followed the Council on Environmental Quality's recommended procedure of how to prepare a draft statement, have it reviewed by other Federal, State, and local agencies, seek intensive public involvement, prepare a final statement, and reach a decision.

Background. The Monongahela National Forest is located in the mountainous region of eastern West Virginia. In pioneer days the area supported vast stands of spruce and some of the finest hardwoods in the world. Clearing for land settlement, accompanied by exploitative logging over many decades, so denuded the upper watersheds of the Monongahela River that they no longer had an adequate and protective timber cover sufficient to regulate water flow. The disastrous flood of 1907 in the Ohio River drainage, along with growing frequency of similar difficulties elsewhere, together with increasing concern over future timber supplies, triggered studies and remedial legislative measures. Subsequently, the Weeks Act of 1911 authorized purchase of forest lands needed to regulate the flow of navigable streams or for the production of water. Based on these land purchases, the Monongahela National Forest was proclaimed by the President in 1920.

Timber Situation. Since the remnants of the original stands in the Monongahela National Forest contained a high proportion of poorly formed and defective trees, the early management goals were to improve the stands over a long time period by removal of undesirable residual trees. This removal, by selection cutting, fitted into the system of all-aged management.

However, in the early 1960's research results indicated that even-aged management was a more desirable system for regenerating a variety of desirable species. Basically, research and field practice clearly indicated the necessity of clear-cutting to regenerate and thus perpetuate certain species of trees which are intolerant of shade or have intermediate tolerance. These include valuable species such as yellow poplar, black cherry, white oak, white pine, black walnut, yellow birch, and certain oaks.

However, many people regarded the adoption of clear-cutting as an alarming development, even though it was done in accordance with improved procedures. Some public reactions developed.

Action Taken. On February 5, 1970, the legislature of the State of West Virginia adopted a resolution which resulted in the appointment of a Forest Management Practices Commission to study the effects of clear-cutting on National Forest lands. On March 23, 1970, the Chief of the Forest Service designated a special review committee to examine and report on timber harvesting practices on the Monongahela National Forest. Because of the importance of the subject and its controversial nature, a draft environmental statement, based on the Forest Service Committee report, was prepared. The draft statement was filed with the Council on Environmental Quality and circulated to other agencies and the public.

Comments of the Forest Management Practices Commission and others were studied carefully by the Forest, Region, and Washington Office. The West Virginia delegation to Congress also expressed extreme interest in this matter.

Results. A thorough analysis of environmental impacts and alternative timber management practices suggested modification of current practices were necessary. Several of these modifications had also been suggested by the Forest Management Practices Commission. The following quote from the final environmental statement illustrates one such modification and recognition of the involvement of others interested in forest management: "The West Virginia Forest Management Practices recommended individual clear-cuts should normally be 25 acres or less in area. We agree with the recommendation and will follow it."

After considerable effort, the final statement was completed and filed December 11, 1970, with the Council on Environmental Quality. At the same time, copies of the statement were sent to the West Virginia delegation, West Virginia Legislature, and other interested parties. The Regional Forester went to West Virginia to publicly announce the decisions resulting from the analysis of environmental impacts reported in the Environmental Impact Statement.

Timber Resources

Effective timber management within the multiple use framework begins with an inventory of the timber resource followed by the preparation of a timber management plan. During fiscal year 1970, new timber management plans were approved for 3.3 million acres of commercial forest land in the National Forests, and in fiscal year 1971, for 1.2 million acres. Timber management plans are revised periodically to keep in balance with revisions of multiple use plans and reinventories of forest resources.

Harvesting excess or dying trees in poletimber and young sawtimber stands improves the growth rate of residual trees and adds to the national timber supply the wood in trees that otherwise would have died and deteriorated before they could be used. Included in the sold volume of timber for fiscal year 1970 were 646 million board feet (in fiscal year 1971, 606 million board feet) of this thinning and salvage material, located primarily in Oregon, Washington, California, Montana, Idaho, and New Mexico. This quantity was in addition to the large volume of sales from other intermediate cuttings and thinnings made annually in the National Forests, mostly in the two eastern regions.

Thinning operations were primarily in young conifer stands. Release work was done in young hardwood stands and in young conifer stands overtopped by brush.

Also, in 1970, 42,738 acres were burned over by controlled fires for silvicultural purposes, mostly to control undesirable vegetation in the understory of southern pine stands.

Total planting and seeding increased in fiscal year 1970 and 1971, and timber stand improvement declined slightly, again due to less work done with deposits made by timber purchasers because of higher unit costs. A total of 261,173 acres in fiscal year 1970 and 267,029 acres in fiscal year 1971 was planted and seeded. Natural regeneration occurred on 52,058 acres of prepared sites in fiscal year 1970 and 40,716 acres in fiscal year 1971.

Trees That Fight Smog

What species should be encouraged in smog-hazard areas? How can smog-resistant trees be bred? How can screens of trees be used to channel the flow of polluted air?

These questions are being answered through a joint study of fire meterology and the effects of air pollution on forest trees, which has proved the value of multidisciplinary research. Data on diurnal and daily variations of concentrations of oxidants in the Los Angeles Basin in California are being used to develop a model of pollutant concentrations and smog damage potential for specific forest areas. Timber stands in this area have suffered extensive mortality and damage because of smog.

Trees As Monitors

The Forest Service has completed an initial study on trees as bioindicators of low-level pollution. Over 1,400 eastern white pine seedlings were exposed to pollutants in the field. Four hundred thirty-five white pine exhibited specific sensitivities to either sulfur dioxide, fluorides, or oxidants. In various combinations of sensitivity-resistance outplantings, these trees can serve as low-cost monitors. Some 64 seedlings were resistant to all air pollution regimes. These developments may be useful where trees now are being killed by pollutants.

● Foresters charged with maintaining green tree belts around reservoirs and with the vegetative recovery of flooded forest lands are often concerned about the effect of water impoundment of the beneficial mycorrhizae and soil microflora. In preliminary studies in the South, the fungi isolated from submerged sweetgum and red oak roots were not significantly different in kind and number from those isolated from roots not subjected to flooding. Long-term studies in different locations will be needed.

Soil Organisms

Land leveling combined with soil fumigation in Douglas-fir nurseries has reduced soil organism populations. The negative result is a deficiency in mycorrhizal associations necessary for good survival in forest planting. Pacific Northwest researchers now advocate extreme caution in using land management practices that fail to protect the natural soil flora and fauna.

● Genetics offers the greatest hope for protecting the quality of environment and the beauty of healthy forest stands. Control of fusiform rust is far more promising through the growing of resistant pines than through direct chemical control. Research helps identify resistant species, clones, and hybrids for foresters who want to plant under a wide variety of soil, site, and rust-hazard conditions in the South.

● Considerable Douglas-fir bark is added to the forest floor by sloughing from standing and fallen trees and by logging. Bark is also used frequently as a garden mulch. Possible adverse effects of tannins in bark on soil properties have been discounted by recent findings that neither bark nor tannins produces harmful effects on the chemical and biological properties of forest soils.

● Millions of tons of tree bark are produced annually by the wood products industries of the Pacific Northwest. Disposing of it by burning creates serious air pollution. Physical and chemical properties of the bark of major tree species of the Pacific Northwest make this material well suited for various uses—mulching, soil conditioning, drainage improvement, animal bedding, protecting logging sites from erosion, protection and stabilization of road and highway cut and fill slopes, filter bed material for effluent disposal, and soil fertilizer (when fortified with poultry manure or nitrogen). Research efforts are being directed to finding more uses for leftover bark.

Forage Production

Range management activities improve the quality of the environment principally by the establishment and maintenance of a healthy and diversified vegetation cover on the land surface.

During 1970 and 1971, intensive management practices were started on about 5 million acres of National Forest System rangeland, to improve the quantity and quality of the vegetation. Included in this acreage are about 1 million acres where the vegetation cover is inadequate to protect the soil. About one-fourth of this acreage was culturally treated by various revegetation methods to expedite its recovery.

Intensive management practices had been initiated, as of the end of 1970, on about 45.7 million acres of the 105.5 million within range allotments; and by the end of 1971, on about 50 million acres. Some 3.8 million acres of rangeland has been revegetated by cultural means since this program started in the fifties.

Even on properly stocked ranges, the areas around water developments are usually overgrazed by livestock. Vegetation on these depleted areas can be improved by controlling access to water only if the range is lightly stocked and closing access to water during the summer growing season. This practice should work best on large range "spreads" where water developments are far apart.

An improved program planning and evaluation process has been developed where offsite environmental impacts will be calculated, compared to approved standards, and made explicit for management consideration.

Fish Habitats

In fish habitat improvement programs, special emphasis was given to improve water quality. Improved water quality generally means an improved habitat for fish. Habitat improvement projects in FY 1970 that resulted in improved water quality included the following: Stream barrier removal (761); protecting stream channels (2,184 rods); new fishing lakes (722 acres); and aquatic weed control (1,882 acres). In fiscal year 1971 these projects included: Stream barrier removal (668); protecting stream channels (4,921 rods); new fishing lakes (714 acres); and aquatic weed control (1,482 acres).

Salmon. Returns of pink and chum salmon during and after logging confirm that timber harvesting in southeast Alaska need not damage salmon streams when logging is done carefully. In cleared watersheds, the suspended sediment concentrations increased during logging, especially during road construction; but the increases were not significant when compared with stream sediment in an unlogged watershed. Cutting produced a maximum increase in stream temperature of 9°F. in the summer months, and the maximum average monthly increase was 4°F. Winter temperatures were little affected.

Chemicals. Degradation rates of four common brush control chemicals—2,4–D, 2,4,5–T, amitrole, and picloram—were measured in forest material obtained from a red alder stand in the Pacific Northwest. The study, conducted in the laboratory under favorable conditions for herbicide degradation, suggests the four herbicides when properly used have little signficant impact on the quality of the forest environment. All four herbicides were degraded but at markedly different rates. Amitrole and 2,4-D were most rapidly degraded.

- **Promote management actions to reduce adverse impacts on offsite environments affected by all forest ownerships.**

Soil Management

Increasing interest in the quality of the rural environment has raised many questions concerning soil behavior. Assistance was provided on a great number of management problems or situations in which soil uses were involved under a wide variety of land resource management systems.

On the Mendocino National Forest in California, for example, the landscape architect, the ecologist, and the soil scientist jointly developed the landscaping details for a newly constructed forest highway.

On the Eldorado National Forest, Calif., a team of specialists together with the District Ranger developed a prescription involving soil trenching, seeding, mulching, and irrigation to stabilize the exposed soils on ski runs in the Lake Tahoe area.

On the Ozark National Forest in Arkansas, a leach field is being used to filtrate the water from the backwashing of the filters of a water treatment plant to prevent polluted material from entering the stream system. On the Pisgah National Forest in North Carolina, environmental quality and economic considerations resulted in a decision to reconsider the location of proposed road sections that crossed highly organic bottomland soils.

On the Siskiyou National Forest in Oregon, soil protection standards were developed that relate to compaction damage by heavy logging equipment during wet weather.

Recreation and range uses, timber harvesting, road construction, and other resources development and use activities are conducted so as to protect and improve land resource quality and productivity. As interest and awareness for the quality of the rural environment continue to grow, questions concerning soil behavior are surfacing at an increasing rate. Assistance was provided on a great number of management problems or situations in which soil use under a wide variety of land resource management systems was involved.

Soil inventories and surveys provide information for resource and development planning that is especially useful for locating and identifying potential soil problem areas that are directly applicable to soil management appraisals. For example,

previously completed soil resource inventories will permit a team of specialists representing various fields to make recommendations for rehabilitation prescriptions during the first visit to a burned area rather than waiting several weeks while soil investigations are conducted.

Restoration of Damaged Watersheds

Treatment of depleted land areas. Land treatment and watershed practices are designed to control or prevent soil erosion through stabilization of depleted lands, improving water-holding capabilities of the watershed to control runoff, and restoring soil productivity. Treatment was applied on 20,000 acres of active sheet erosion in 1970 and 16,000 acres in 1971; 100 miles of gullies in 1970 and 300 miles in 1971; 100 miles of streambanks in 1970 and 150 miles in 1971; 1 mile of lake shoreline in 1970 and 2 miles in 1971; 1,200 miles of abandoned roads and trails in 1970 and 1,000 miles in 1971; and 400 acres of land disturbed by surface mining and prospecting in 1970 and 100 acres in 1971. These accomplishments cover less than 1 percent of the total rehabilitation work needed to improve land productivity and enhance environmental quality.

Treatment of fire and flood disaster areas. In 1970, major disaster areas, declared by the President of the United States, affected these National Forest lands: (1) Northern California caused by floods in January and February, (2) southern California caused by fires, and (3) northern Arizona and southwestern Colorado caused by floods in September. The tremendous damages had a serious effect on the environment and on the development of forest resources.

Emergency rehabilitation work on some of the worst forest fire "blowups" in the annals of the States of California and Washington was necessary to protect life and downstream property and to prevent further environmental deterioration due to surface soil losses. First aid treatment is generally in the form of grass seeding to provide quick plant cover to reduce soil losses, channel clearing to allow free flow of water to reduce streambank soil losses, and land surface manipulation to provide better drainage of expected excessive runoff. Rehabilitation work was performed on 375,000 acres of burned areas, caused by 25 major fires on National Forests. In addition, 25,000 acres of forested lands burned by smaller wildfires were also treated. In Arizona, as a result of floods, stabilization measures in and along stream channels were necessary to provide protection against later storms.

Surveillance of land management activities

National Forest lands contain 83,000 miles of flowing streams which include 20,000 miles of anadromous fish streams, 1.4 million surface acres in reservoirs, 15,000 natural lakes or ponds, and 11,000 miles of estuarine shoreline. In addition, large volumes of fresh water are stored in snowfields and 1,000 glaciers. National Forest System lands yield 390.4-million-acre-feet of water annually.

In 1970, and again in 1971, about 25 million visitor days were credited to those who used the National Forest water resource for recreation. It is estimated that this resource attracted many other millions of visits, showing how important it is to maintain high standards of water quality for these visitors, as well as users downstream.

Federally approved water quality standards are now being used for all navigable waters on National Forests. Water pollution problems encountered in carrying out land management activities must be identified and regularly evaluated so as to protect water quality. A more specialized system to check on National Forest land management and use activities is now planned for 4,000 selected watersheds including 1,100 municipal supply watersheds which are the principal source of community water supplies.

During 1970 and 1971, 41 water surveillance stations operated in 19 States. A reconnaissance survey involved selected water quality criteria for surface waters in Arizona and New Mexico. This activity early identifies changes and trends in water quality, and provides a basis for prompt, corrective action where necessary.

To meet the national policy for nonimpairment of existing high quality waters, a start has been made to translate local water quality standards into performance limits and controls for action programs.

During 1970 and 1971, the Forest Service participated with Public Health Service, Department of Health, Education, and Welfare, and local State boards and health in vector control studies of two watersheds. Of particular interest in these studies were insects, other anthropods, and rodents that transmit disease from lower animals to man. Emphasis was placed on monitoring mosquitos, do-

mestic flies, and deer flies and controlling them by land management practices.

Flood Prevention

Protection, sound management, and improvement of forest land resources are vital parts of 10 flood prevention and 369 small watershed projects throughout the country. Forest Service efforts, along with those of other Federal, State and local agencies, in cooperation with private landowners continued toward meeting project goals. The results will be more stable soil and cover conditions, with the end product a better environment.

As a result of carrying on one of the world's outstanding reforestation projects, the Yazoo-Little Tallahatchie watershed no longer spews over 100 million tons of sand and sediment out of its highly erodible hills each year. Naming of the Little Tallahatchie as the "Watershed of the Year" by the 1970 National Watershed Congress dramatically illustrates the progress made in improving the quality of life and environment.

The Los Angeles and Santa Ynez flood prevention projects include both structural and land treatment measures on upstream reaches, helping protect the Los Angeles area, one of the Nation's largest urban and industrial complexes.

The Potomac River flood prevention project deals with an interstate basin rising in precipitous mountain country and flowing through the rapidly growing Washington Metropolitan Area. Progress in 1970 and 1971 included planting trees on strip mined area and open land, trail and road erosion control, stream debris removal, and landslide stabilization.

Other flood prevention projects where forestry progress was made in protecting and improving quality of life included the Coosa in Georgia and Tennessee, the Little Sioux in Iowa and Minnesota, the Trinity in Texas, and the Washita in Oklahoma and Texas.

Special Treatments

In addition to authorized flood prevention projects, limited funds are available for emergency treatment of watersheds impaired by fire or other natural disasters to prevent subsequent loss of life or serious erosion or sediment damage. The Forest Service participated with the Soil Conservation Service and others in treating damaged watersheds in California, Nevada, Virginia, and Washington.

The Forest Service and cooperating State foresters provided technical assistance in the field of recreation to 1,000 owners in 1970 and 9,000 in 1971; in the field of water quality to 1,500 owners in 1970 and 2,100 in 1971; and in the field of wildlife to 2,900 owners in 1970 and 3,700 owners in 1971. Collectively, owners placed 880,000 acres of forest land under protection from fire, grazing, pests, and erosion in 1970 and 2,280,000 acres in 1971. Under the program, 136,000 acres in 1970 and 152,000 acres in 1971 were seeded or planted with forest trees.

Natural Beauty

Power transmission lines, natural gas pipelines, and microwave communication systems can be designed to harmonize instead of clash with the scenic landscapes they sometimes cross. The Forest Service has worked closely with industries and private designers to develop structures that use appropriate colors, shapes, textures, et cetera, to make them compatible with their environment. Results of these experiments will be applied to National Forest landscapes throughout the Nation and the experience so gained will be made available for public and private use.

Timber harvest areas can be pleasingly patterned so that their boundaries are in harmony with the natural landscape. The Forest Service is developing a new landscape management approach in timber harvesting, one which includes a design input responsive to public interests. To attain this quality control of the environment, the Forest Service has recruited and trained the Nation's and perhaps the world's largest aggregation of landscape/environmental technicians. These landscape architects are skilled in harmonizing man's installations and signs of land management with Nature's moods and natural beauty.

Framework for the Future

During the latter part of 1970 and continuing in 1971, all Forest Service manuals and handbooks began to be updated to include objectives and policies implementing the National Environmental Policy Act of 1969 and the policy guides contained in "Framework for the Future," published in February 1970.

Logging Improvements

Effective cable and tractor logging systems designed to reduce adverse impacts of timber harvest on soil and water were promoted in special train-

ing programs for industrial, Federal, and State forestry personnel in five western States. Quality logging practices were taught to other loggers in a continuing national program of on-the-ground technical assistance. Exploratory work is underway on the use of balloons and helicopters in harvesting timber, so as to minimize road construction.

The years of this decade will see increased contacts with, and assistance to, contractors and loggers. Stress will be on increasing efficiency, reducing harvesting wastes, and minimizing ecological disturbances.

• Promote Practices to Protect and Enhance Environmental Quality in Management of All Forest Ownerships.

Roads and Equipment

The Forest Service recorded substantial progress in 1970–71 in making engineers and resource managers aware of the opportunities to maximize scenic beauty in constructing about 7,000 miles of road annually. The publication "Scenic Roads," which was well received nationally by engineers and road managers, is an example of fostering this awareness.

The Forest Service responded promptly to President Nixon's Executive Order 11507 dealing with the prevention, control, and abatement of air and water pollution at Federal facilities. It inventoried its need and assessed its ability to perform within 6 months of the order. An increase of $13 million in pollution abatement funds is planned for fiscal year 1972 to correct pollution at 1,612 installations and strengthen the position of the Forest Service in preventing future pollution.

Currently, the Forest Service is studying ways to cooperate with local jurisdictions and private developments in reducing air pollution by providing for adequate solid waste disposal facilities.

Projects have been initiated and planned to test available equipment and to develop new systems for eliminating air and water pollution at the Forest Service Equipment Development Centers. The equipment fleet uses nonleaded fuels to help cut down on air pollution.

Construction specifications were reviewed in 1970–71 and strengthened in areas previously weak from an environmental standpoint. Further considerations will provide for more control over contractors' activities during construction to minimize erosion, siltation, and campsite pollution.

Control of Forest Pests

Bark beetle damage in old-growth forests, valued primarily for scenery and recreation, poses a special problem in many Western States. A system, developed in California, for rating the susceptibility of trees to the western pine beetle has been effectively utilized in mature ponderosa pine stands in Montana. Although the total mortality was low during 20 years of study, losses were greatest in trees rated as high risk. Thus, selective removal of such trees in Rocky Mountain forests promises to reduce damage caused by the western pine beetle while maintaining both scenic and timber values.

Substitutes for DDT are urgently needed in order to control major forest defoliators with minimal impact on the environment. Zectran, a short-lived insecticide, has been tested and found to be more toxic to the western budworm than any other insecticide tested to date. Additionally, Zectran and its main active metabolites are readily broken down in sunlight and in plant and animal systems. Thus, it poses little hazard to the environment. These and other studies indicate that Zectran can be effectively and safely used against the budworm, and possibly against several other major defoliators.

Pyrethrins are highly effective against a variety of insects and have little adverse effect on the environment. However, they break down readily in sunlight, and this limits their usefulness. Forest Service scientists have recently developed a stabilized formulation of pyrethrins that resists breakdown in sunlight. Field and laboratory tests indicate that this formulation is highly effective against the western hemlock looper and other important forest defoliators.

Naturally occurring attractants that influence insect behavior have recently received increased attention as an alternative for hard pesticides. Studies in California have shown that a mixture of the chemical attractants *exo*-brevicomin, frontalin, and myrcene is highly effective in attracting the western pine beetle to traps. This mixture has great potential for use in insect surveys and in manipulating bark beetle populations.

Early detection and prompt evaluation of insect and disease attacks were aided by new re-

mote sensing techniques to identify outbreaks in parts of the United States more rapidly. Also, a computer program was developed and put into operation in the South to analyze detection survey and biological evaluation data, speeding the job while costing less. Nationwide, some 555 million acres of forest land were examined for pest outbreaks in 1970 and 648 million acres in 1971.

Several projects were carried out to suppress populations of defoliating insects. The major projects in 1970 were treatment of some 200,000 acres for suppression of spruce budworm in Maine and in 1971 treatment of 340,000 acres in numerous small blocks for suppression of gypsy moth in New Jersey, New York, and Pennsylvania. Attacks by bark beetle in pine, fir, and spruce stands in the South or West were of sufficient magnitude to require treatment. New synthetic attractants called Pheromones offer hope for more selective trapping of culprit beetles. Stand sanitation was performed on many acres in various parts of the West to suppress dwarf mistletoe infection.

Blister rust treatments were applied to white pine stands where the cost/benefit ratio was favorable. Major efforts to prevent spread and intensification of oak wilt on eastern oaks were concentrated in Pennsylvania and West Virginia.

CONTROL OF WILDFIRES

Fire Detection and Reconnaissance

An operational experiment in an 8,000 square mile area of the Northern Rockies demonstrated the high efficiency of an airborne bispectral infrared scanning system for fire detection. This system developed by Project Fire Scan at the Northern Forest Fire Laboratory was tested along with conventional visual fire detection from lookout stations and patrol aircraft. The infrared system can "see" tiny fires at night and through dense smoke when visual methods fail. A computer analyses of the new bispectral system indicates a performance potentially 10 times better than single channel systems.

In addition to fire detection, the new infrared system is highly efficient in mapping larger fires and in locating hot spots.

Lightning Sensing

Project Skyfire is making substantial progress in sensing lightning that is responsible for 60 percent of the fires and 68 percent of the area burned on federally protected forests.

A lightning recording system has been designed to measure the electrostatic field changes associated with discharges occurring within about 25 mile radius of the recording site. In addition, the system detects and records luminosity, thunder, and the flash image of all discharges occurring within the same radius. Designed primarily to measure changes in lightning during cloud-seeding experiments, the system can document features present in discharge that causes forest fires. Modification and testing through three seasons' use have resulted in a compact, relatively trouble-free unit for ground-based lightning studies.

Fire Prevention Task Force

An interagency task force has surveyed man-caused fire prevention problems throughout the South, where some 60,000 man-caused fires occur annually. The results of the survey provide a new basis for the design of fire prevention research aimed at reducing the occurrence of fires at critical times, places, and situations in southern forests. A new system approach will be developed, utilizing computer-aided evaluations of fire occurrence and hazards, studies of specific risk factors at selected sites, and test prevention methods tailored to risks and fire danger.

Fire Prevention Education

Fire prevention research is developing methods for educating children to be careful with fire. Kindergarten and first grade children participating in a 20-lesson television program on fire prevention and conservation education showed significantly higher test scores than did those from unexposed control classes.

Fire Hazard Reduction

Research progress in several regions is accelerating application of fire hazard methods and protection of environmental quality. In the Northern Rockies and Pacific Northwest, use of smoke management guides and improved burning techniques is permitting slash disposal during periods that prevent smoke accumulation in critical areas. In the South the chevron burning technique permits safe use of prescribed fire on hilly terrain. In California, preliminary experiments show promise of developing combined dozer smashing of fuels,

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aerial application of desiccants and prescribed fire as a method for reducing fire hazards of chaparral. Results show a 75 percent reduction of fuels averaging 35 tons per acre.

Fire Retardant Chemicals

During 1970, more than 2 million gallons of a new liquid concentrate fire retardant were dropped on Western fires. This experience and the background of knowledge about other types of chemicals has led to establishment of new field and laboratory experiments to develop criteria for selection of chemicals to meet specific fuel and fire conditions and delivery systems to achieve maximum fire retardant efficiency. The urgent need for this information promoted implementation of the experiments immediately folowing the fire season.

Forest Fire Meteorology

"Fire Weather," a 12-chapter text aimed at developing an understanding of basic fire weather information in the United States, has been issued as Agriculture Handbook No. 360. Some chapters discuss the static properties of the atmosphere, such as basic physical principles, temperature, atmospheric moisture, and atmosphere stability. Other chapters describe atmospheric dynamics resulting from general circulation and local winds and through air masses, fronts, clouds, precipitation, and thunderstorms. Another chapter deals with the moisture response of dead and living forest fuels to changing weather conditions. A final chapter summarizes regional fire weather and important synoptic fire-weather patterns.

Weather Modification

In a followup to Project Skyfire research results that show lightning fires can be prevented through cloud seeding, work is proceeding on the development of an operational weather modification system for fire control. Project Skyfire also assisted the Bureau of Land Management in cloud seeding operations for reduction of fire danger in Alaska.

Fire Mathematical Model. A mathematical model for computing fire spread and intensity has been completed. This model was evaluated by the National Fire-Danger Rating System project during the fire season. A computer program has been supplied to the National Fire-Danger Rating project.

Fuel Breaks and Fire Control. Fuel breaks technology developed by the Western Forest Fire Laboratory at Riverside, Calif., proved effective during extreme fire emergencies generated by searing Santa Ana winds.

Aerial Fire Suppression Techniques

Research and development work is underway on the improvement of aerial fire suppression techniques. This work is directed toward providing new fire-retardant delivery and dispensing systems for both rotary and fixed wing aircraft, effective fire attack methods for helicopters under restricted visibility conditions, and command and control systems for firefighting operations. New aircraft systems are being field tested. Cost-benefit analysis are being made of fire control system alternatives.

RECREATION MANAGEMENT

Avalanches. Public exposure to avalanche hazard is increasing. The Forest Service recognizes its responsibility for public safety at winter sports sites and in cross-country travel stimulated by ski-tour promotions and increasing use of snowmobiles. The Forest Service has therefore initiated a coordinated program to develop a national avalanche forecasting system. It also held the first national avalanche school in Reno, Nev., in December 1971.

Residences. A new technique called RECZIP has been developed for obtaining important information about the residence of users of recreation sites. These refinements are logical additions to the techniques developed in previous years for statistically sampling recreation use.

The new system utilizes the postal ZIP codes furnished by visitors in their fee system permits. The potential is great for adding reliable information about the habit patterns and outdoor recreation preferences of groups with differing cultural, social, and ethnic backgrounds.

Handbook. A new and more meaningful approach to recreation planning utilizing a new Recreation Planning Handbook issued to field units early in 1971, is being stressed. This planning system, when complemented by the new inventory approach described earlier, will contribute greatly to a better foundation for the scientific management of, and research about national forest recreation resources.

Environment Inventory. A new technique for measuring and evaluating the recreation characteristics of national forest land and waters was pilot-tested successfully in the Lake Tahoe Basin

in California. Included are environmental, scenic, and cultural considerations. These characteristics can be measured by quantity and quality to serve as benchmarks against which the results of future planning decisions and user-impacts can be evaluated. The recreation inventory will also produce for the first time, urgently needed estimates of the carrying capacities of national forest lands and waters for recreation purposes. With anticipated improvements, this new recreation environment inventory will be applied throughout the National Forest System as rapidly as feasible. When completed it will provide the Forest Service an essential link in total multiple-use planning.

Fee system. Fees for recreation use of the national forests have been charged as a part of the Federal recreation charge program under the Land and Water Conservation Fund Act. In 1970, these fee receipts amounted to $1,716,898 for daily permits and $1,435,084 for annual permits, for a total of $3,151,982. In 1971, receipts were $3,323,542 for daily permits and $1,632,310 for annual permits, or a total of $4,955,852. Local counties receive 25 percent of the receipts from the daily permits.

The land and water conservation fund charge system expired December 31, 1971. Until it is renewed by congressional action, all charges on the national forests will be daily charges.

- **Encourage prevention and abatement of air, water, and soil pollution from operations of forestry-related enterprises.**

Air and water quality

President Nixon's Executive Order 11507, issued February 4, 1970, established a deadline for pollution abatement and protection of air and water quality at Federal facilities. An earlier Executive order, No. 11258, issued in 1965, had defined the objectives. In the same year, the Forest Service began to accelerate its program and estimated that $100 million would be needed to protect water quality and provide modern water systems to public users of national forest lands and to administrative sites.

A multidiscipline task force was charged with developing a program to meet Executive Order 11507 standards and the deadline of December 31, 1972. Water quality projects previously inventoried were updated, in cooperation with the Federal Water Quality Control Agency and Office of Management and Budget. Setting the size of the program, developing schedules, determining manpower needs, and consideration of several organizational alternatives were considered and evaluated. Alternatives provided for maximum use of architectural and engineering consultants.

The task force report in August 1970 confirmed earlier estimates of the need for a $100 million program. Program implementation will provide for a management and economic feasibility evaluation of all Forest Service facilities identified with this program during the next 3 to 5 years. When completed, the project should have no health hazard or environmental degradation from any form of pollution traceable to the operation of Federal facilities.

Woodsy Owl launches antipollution campaign

On September 15, 1971, Woodsy Owl became the Forest Service's nationwide symbol dedicated to combating pollution and improving the environment of forests, woodlands, and open lands. His theme, "Give a Hoot! Don't Pollute," will be aimed at reducing virtually all forms of pollution in outdoor areas of the United States. It will focus attention on environmental enhancement goals, emphasizing the protection of soil, vegetation, air, and water through thoughtful use; elimination of unnecessary noise; and personal responsibility for control of vandalism and destruction of the Nation's out of doors.

WILDFIRE CONTROL

Wildfire losses in 1970

Uncontrolled wildfires remain a major threat to forest resources. In 1970, early summer drought and high temperatures brought extreme fire danger to many parts of the West. Numerous man-caused and scattered lightning-set fires resulted in serious losses on the National Forest System. In all, 15,000 fires burned 553,000 acres, the highest number in 36 years; 7,174 fires were man-caused. Some 99 percent of all fires were controlled with little resource loss. Of the 201 fires escaping initial attack, 20 burned 93 percent of the total acreage. Wildfires causing the most devastation occurred under rare conditions of severe drought, high temperature, low humidity, and strong winds.

Federal, State, county, and municipal fire organizations cooperated in the closely coordinated

ground and air attacks in Washington and Oregon. The military supplied trucks, mess facilities, fire suppression forces, and reconnaissance aircraft. Women drove trucks, kept time, operated radios, cooked, and did many other support jobs. Indians, Spanish Americans, Negroes, and Eskimos formed the backbone of the organized fireline crews. On August 31, 1970, the peak day, over 11,000 men were engaged in fire suppression operations. Post season fires in southern California, ending in November, added another 350,000 acres to the season's burned acreage.

Wildfire losses in 1971

The 1971 fire season began early with a record drought in the Southwest. Extreme fire danger was matched with increased preparedness. Attacking the fires hard, as they started, paid off. In all, 12,200 fires burned 237,000 acres, less than the previous 5-year average of 272,000 acres. Increasing numbers of man-caused fires resulted in serious losses on the National Forest System; 6,300 of the fires were man-caused, an increase of nearly 800 over the previous 5-year average.

In 1971, 93 percent of all fires were controlled at 10 acres or less in size. Less than 1 percent were large fires burning over 300 acres. These accounted for approximately 70 percent of the burned acreage. Forest fires burned 1.13 acres for each 1,000 acres protected. Wildfires causing the most devastation occurred under rare conditions of severe drought, high temperatures, low humidity and strong winds.

Cooperation with State protection agencies was excellent. A high level of cooperation continues with the Bureau of Land Management, National Park Service, Bureau of Indian Affairs, State highway patrols, and counties. Federal Aviation Administration and various flight services reported fires observed by private, commercial, and military aircraft. Relationships with military and National Guard units were good. The fire weather forecasters of the National Weather Service provided key support for fire control activities. The U.S. Coast Guard voluntarily provided crews for two fires on the South Tongass National Forest, Alaska.

Well trained, experienced men in top physical shape serve as the foundation of the fire organization. Indians, Spanish Americans, Negroes, and Eskimos were the backbone of the organized fireline crews. The Forest Service inter-regional crews, the Southwest firefighting crews, and other crews of 22 to 25 men working together proved they could construct and hold fireline in tough situations.

Abatement of hazards

Nonburning methods were used to abate fuel hazards in 1970 on 309,000 acres of slash generated by timber harvests and on 329,000 acres in 1971. Over one-third was chipped or chopped or given extra protection until the slash deteriorated. The balance was treated by burning under conditions when smoke would dissipate properly. Construction of firebreaks and fuel breaks and conversion of fuels to vegetation with less flammable conditions provides another form of fuel reduction and enhances the natural environment.

Equipment improvements

Many advances were made in the development of fire control equipment. The short Skyvan aircraft was evaluated for flight characteristics by San Dimas Equipment Development Center and Edwards Air Force Base, and for smokejumper and paracargo capabilities by Missoula Equipment Development Center. The Caribou aircraft was evaluated for smokejumper and paracargo capabilities by MEDC. Both aircraft exhibit great potential and will be used in the field this coming season. Greater emphasis is being given to equipment development for the safety and welfare of firefighters. This includes the new FS–10 parachute which is now the Forest Service standard, and a new fire resistant paper bedroll. An effective training tool, the Compact Simulator, is now produced commercially and is in use by field units.

Accelerated programs are underway in four Forest Service regions to eliminate preventable fires. The Association of American Railroads adopted a spark arrester standard for non-turbocharged diesel engines used in railroad locomotives. The standards have potential for nationwide use.

Three national training courses graduated 138 individuals, improving performance in fire prevention, fire management, and infra-red photo interpretation.

A fire planning project was begun on all national forests. Upon completion it will provide a current up-to-date plan for improving fire management effectiveness.

Promote and Achieve a Pattern of Natural Resource Uses That Will Best Meet the Needs of People Now and in the Future.

- **Cooperate with other Federal, regional, State, multicounty, and county agencies in resource management, and in planning and economic development programs.**

Within the scope of its authorities, the Forest Service actively supports State and local efforts in eliminating problems and developing new opportunities in rural areas. Rural development receives priority attention at National, State, and local levels in resource planning, development, and management activities. Plans and activities are integrated and coordinated with the comprehensive plans of States and State-designated planning districts.

The Forest Service responded to increase public demands for environmental concern by reappraising its several management functions, including administration of the National Forest System, forestry research, and cooperation with State, municipal, and private land owners.

TYPES OF PROGRAMS

Air, water, and soil quality is improved and natural beauty is enhanced through several cooperative programs in which the Forest Service participates with State foresters and other agencies. These combined efforts on local, regional, and national levels effectively bring numerous economic and social benefits to many communities.

Watershed programs

Pollution, floods, and droughts have caused widespread public awareness of the importance of water in our national life. With about one-third of the Nation forested, and yielding over 60 percent of the total water available, proper management of forested watersheds has a real and direct impact on each of us—individually and collectively. Over three-quarters of the Nation's forest land is included in current studies. Measures for forest land treatment included over 650 small watershed project plans and 10 flood-prevention projects make Forest Service involvement a direct responsibility.

Federal-State Cooperative Forest Management Act program (CFM)

The program provides technical assistance to forest owners to improve management and productivity on their lands and to assist them in harvesting and marketing their forest products. The Federal Government and the States cooperate in carrying out the program. The program is aimed at the more than 4 million owners of 300 million acres of nonindustrial, private forest land which represents 59 percent of all commercial forests in the United States. Production from these forests is needed to meet national housing goals forecast by President Nixon. Effective management on these lands will also insure maintenance of a high quality environment.

Rural environmental assistance program (REAP)

Administered by the Agricultural Stabilization and Conservation Service (ASCS), the program assigns responsibility for the forestry aspects of technical assistance to the Forest Service in cooperation with the State foresters. The program consists, in part, of forestry technical assistance and cost-sharing for certain forestry practices on private and non-Federal public farmlands.

Naval stores conservation program (NSCP)

The program provides technical assistance and cost-sharing in applying approved naval stores practices on turpentine farms. ASCS administers the program with technical responsibilities assigned to the Forest Service in cooperation with the State foresters of Georgia, Florida, Alabama, and Mississippi.

General forestry assistance (GFA)

Funds are used by the Forest Service in cooperation with State forestry agencies to accomplish highly specialized forestry assistance not available through other Forest Service programs. Such assistance is provided for the purpose of developing, managing, and utilizing forest resources for maximum benefits to the Nation's people and economy.

Forest pest control program

Depredation by insects and diseases on forest lands in all ownerships causes annual losses approximating 40 percent of the Nation's current timber harvest. Protection activities include prevention, detection, evaluation, and suppression of pest outbreaks on all Federal lands; coordination of the program on lands of all ownerships; and Federal financial and technical assistance to States for cooperative detection, prevention, evaluation, and suppression on State and private lands.

Wildfire protection

Since 1924, State forestry organizations have cooperated with the Forest Service in securing permanent and adequate protection for State and private forested and nonforested watersheds under authority of section 2 of the Clarke-McNary Act. The States and Forest Service work together to reduce wildfire losses on State and private lands.

Organization

The Forest Service assists the State conservation systems in analyzing and improving their organization and personnel management, and getting new knowledge into practical use through information, education, and training. This program, aimed at all 50 States, is just beginning to gain momentum with beneficial results.

RESULTS FROM PROGRAMS

General forestry assistance

A prime goal of the Forest Service has been to manage and develop the Nation's forest resources so as to help sustain local economics and enhance the forest environment. Regular Forest Service programs increase or improve employment, economic opportunities, and living conditions in rural America.

More than three-fourths of the Nation's 519 million acres of commercial forest land is in private, State, and local public ownership. Federal-State cooperative programs are designed to provide forestry assistance to forest landowners, loggers, forest industry, communities, and public and private agencies and organizations; to test new approaches to providing technical forestry assistance; and to provide assistance to State foresters in carrying out their programs.

There are currently 30 general forestry assistance (GFA) projects in 26 States, of which 17 were initiated during 1971. In some cases, project work is carried out by State forestry personnel, while in others private contractors have been engaged.

In six States (five in 1970), projects provided for a specialist on the State forester's staff to work with State planning agencies and labor, education, and economic development organizations, as well as other State and Federal agencies and private organizations. Specialists are also provided through GFA projects in seven States to work with multicounty planning regions. The purpose of these projects is to maximize the use of forest resources in all aspects of State and local planning and development. In three States, a GFA project with Tuskegee Institute is exploring ways of bringing forestry services to minority forest landowners. Four projects are aimed at providing forestry services to urban and community areas. Other operational projects are developing markets for small size classes of timber in areas where high-grading and excessive logging residues have been a problem. Encouraging results have been recorded in the short time these projects have been operating; they will foster similar activities in numerous other States in the coming decade.

Managerial proficiency

The technical assistance program to State forestry organizations has been accelerated to enhance their managerial proficiency. Participation in these services by State representatives is gratifying. Six reorganization programs have been adopted and organization studies are underway with five other States. Experience gained to date will improve these programs and guide other States as they steadily seek to serve better the demands of their citizens for State resource utilization.

Organization and management training courses are being provided State Forester staffs on an increasing basis with over 1,000 State personnel benefiting during each of the years 1970 and 1971. These courses are designed to improve State operations in directing their forestry based services to private landowners.

Workload measurement studies and long-range planning resulted, during 1971, in improved performance in 10 State organizations (12 in 1970) with regard to their effectiveness and efficiency in

attaining established goals. These projects help States quantify resource management needs down to the basic organization levels. States in which these projects have been completed will possess basic data essential to development of long-range plans to meet State resource management needs. These will, in turn, reflect the State's contribution to needs of the Nation.

Many States have participated in one or more special projects such as job enrichment, employee development safety, records management, and salesman's courses for service foresters.

Personnel management studies made in four States have disclosed numerous problems that were unknown to top management. Subsequent corrective action helped improve the morale and productivity of personnel. Studies of this type are anticipated for other States.

Watershed benefits

Eight out of 10 of the 1,561 small watershed projects authorized for planning include forest land. In solving local land and water problems, these projects also preserve and protect our national resource base. Planning and technical assistance to local sponsors and landowners are provided for forest land in collaboration with the Soil Conservation Service, the State Forester, and other State and local agencies.

Also, forestry measures were installed on 369 watersheds, of which 228 were assisted by Public Law 566 funds. Installation of land treatment measures on National Forest System lands was carried out in 52 projects. Forest land surveys and investigations were continued on 355 watershed projects in 1970.

Further progress has been made in developing capabilities in water-related disciplines, particularly in hydrology and water resource economics. This enables the Forest Service and State Forester to backstop local sponsoring organizations and other agencies in planning the forest land aspects of municipal watershed management, urban watersheds, water control for timber production, wild and scenic rivers, and estuarine and shoreline studies.

Progress was made in making and using supply and demand projections of goods and services obtainable from forest land. Without such knowledge, the public cannot know the options or alternatives in planning renewable resource use now and during the coming decade.

Timber supplies

Nonindustrial private forest land must produce more than half of the Nation's future timber requirements at satisfactory supply-price relationships. To help attain this goal, the Forest Service cooperated with State foresters to provide technical assistance, in 1971, through 878 service foresters employed by 50 States, Puerto Rico, and the Virgin Islands. (In 1970, 832 service foresters were employed by 49 States.) Out of a total of 4 million-plus forest owners on 300 million acres of land, some 128,000 were assisted in managing 7.9 million acres of forest land. (In 1970, 115,000 owners were assisted in managing 6.9 million acres of forest land.) Landowners in 1971 planted or seeded 152,000 acres (150,000 in 1970) and performed timber stand improvement on 153,000 acres (136,000 in 1970). This assistance resulted in a gross return to these landowners of about $27 million in 1971 and $32 million in 1970 from forest products harvested. The Federal share in financing the cooperative effort was $4.4 million and the States' share was $9.2 million in 1971. In 1970, the Federal share was $3.3 million and the States' share $8 million.

Marketing developments

Research in analysis of multiple-use alternatives has included development of a computerized resource allocation model to aid in improving management planning for national forest lands. This model also is useful in developing long-range management plans for private lands.

Research relating to management of 200 small forested ownerships in Michigan's Upper Peninsula revealed that actual timber harvesting since 1960 has differed sharply from original intentions stated by their owners. Increased rates of timber harvesting and related forest management activities were found on most tracts on which high volumes of merchantable timber had accumulated, whether or not owners originally had considered timber harvesting in 1960. After timber sales, owners appear to become indifferent to timber growing and indicate other reasons for maintaining forest ownership.

Reforestation programs

State nurseries, operating cooperatively with Forest Service, produced 551 million tree seedlings in 1971 for use in forestation—44 million more than were produced in 1970. These seedlings com-

bined with tree planting stock derived from other nurseries, including forest industry nurseries, amounted to about 879 million trees (788 million trees in 1970). When planted, these trees help provide environmental enhancement and site protection to over 1.3 million acres of State and private lands in 1971 (1.2 million acres in 1970). They also help to fulfill future wood and fiber resource needs. A realistic goal under present programs is to increase Forest Service planting to over 1.7 million acres annually by 1980.

The rural environmental assistance program (READ) shares the cost of a very large proportion of the acreage planted or seeded, or subjected to timber stand improvement. The latest available figures for fiscal year 1970 show that 133,000 acres were planted on 17,500 farms for a Federal cost-share of $2.39 million. Timber stand improvement was practiced on 132,000 acres of 7,500 farms for a Federal cost-share of $1.42 million.

Cooperative planting program

Under a unique cooperative program with Hunt-Wesson, California food processing company, reforestation is being undertaken on fire-damaged areas in the National Forests. The company is contributing financially toward the growing of forest tree seedlings at established Forest Service nurseries. Each consumer who sends in a label from one of the company's canned products receives a certificate specifying that a tree will be planted in his name in a National Forest area. More than 1 million persons have responded to date, and some 30 other companies and youth organizations have expressed interest in starting similar programs. This response indicates that millions of people across the country want to be involved in useful environmental activities on public lands.

Genetics improvement

Tree improvement programs in 28 States are directed toward improving the genetic quality of tree planting stock used in forestation. In 1970, more than 130 million trees of improved genetic quality were planted; this figure increased by 10 million in 1971. By 1980, well over 70 percent of the trees planted in the South alone will be of improved genetic quality. On the average, each improved tree contributes better than 15 percent more volume than does an unimproved tree. Attending benefits will accrue also for wildlife, recreation, and other components of the environmental complex.

Cooperative funding was provided to 27 States in 1971 (26 in 1970) in support of programs for the detection and evaluation of forest pest outbreaks and for providing technical services to forest landowners and managers. Also, the Forest Service provided cost-sharing with 22 States (21 in 1970) for prevention and control projects to suppress serious forest insect outbreaks and disease conditions.

• Help insure water yields of the quality and quantity needed.

The major thrust of soil and water management in 1970 and 1971 has been on essential services to: (1) provide geologic, soils, and water information essential to multiple-use planning; (2) develop standards and methods to minimize impact of forest development and use on soil and water resources and the natural environment; (3) develop prescriptions to assure that resource programs protect and enhance soil, water, and other environmental values; (4) appraise the effects of alternative uses on soil and water resources; and (5) provide surveillance that assures national forest uses and programs are compatible with environmental protection, especially enhancement of water quality.

Soil, geology, and water resource inventories were conducted on over 7 million acres in 1970 and 13.2 million acres in 1971. Soil and water resource analyses, planning, predictions, and evaluations were made on 50 watersheds in 1971. To date, soil and water data and their scientific interpretation have been provided on over 73 million acres.

Soils, geologic and hydrometerologic management services were provided on more than 1,000 priority resource development projects in fiscal year 1970 and more than 2,000 in fiscal year 1971. This activity includes the development of resource protection requirements and design services to guide project activities such as timber harvesting; range, wildlife, and fish habitat improvement; and fire preattack planning.

Water yield improvement

Protection and management of important water-yielding areas on national forests are a vital and continuing task. Recent investigations have shown that significant increases in water yields and augmentation of low waterflows can be obtained in selected national forest areas through more inten-

sive forest and range management. The cost is equal to, or less than, other methods of increasing water supply. Water yield improvement work on the national forests during fiscal years 1970 and 1971 consisted principally of maintenance of previously completed projects. To date, water yield improvement practices have been applied on over 165,000 acres and similar opportunities exist on an additional 12.5 million acres within the national forests.

Wild, scenic, and recreational rivers

The passage by Congress in 1968 of a Wild and Scenic Rivers Act, Public Law 90–542, provided a means for protecting some of the Nation's rivers in their free-flowing condition. In establishing the National Wild and Scenic Rivers System, Congress designated all or portions of eight rivers as initial components of the system to be administered by the Secretary of the Interior or the Secretary of Agriculture. The act also designated 27 other rivers for detailed study as potential additions. The Forest Service has the study leadership responsibility for nine of the study rivers. They are the Chattooga in Georgia, North Carolina, and South Carolina; the Flathead in Montana; the Illinois in Oregon; the Salmon, Priest, Moyie, and St. Joe, all in Idaho; the Skagit in Washington; and the Pere Marquette in Michigan.

Each of these river studies is a cooperative effort with various Federal, State, and local agencies and other interested groups and individuals. Public listening sessions have been held where studies have progressed to the stage where tentative plans could be presented.

During 1971, field work was completed on the Chattooga River and the Pere Marquette River studies. Major effort was expended on the St. Joe River and Flathead River studies while lesser starts were made on the remaining rivers.

Environmental impact surveys and tributary land treatment

Water developments to meet the needs of the Nation for power, irrigation, flood control, and other purposes continue to be planned for and constructed in and adjacent to National Forests and National Grasslands. Each water development project poses resource problems and opportunities peculiar to the individual site under consideration, the adjacent and tributary lands, and the associated rural area environment. This requires a comprehensive environmental impact survey by the Forest Service. Expanding public concern for the environment demands more comprehensive reporting of environmental effects of water resource projects.

Environmental impact surveys delineate the effects of reservoirs and other water resource development projects on the protection, administration, and management of National Forest System lands. These surveys also determine the effects of such projects on forest users and permittees and on the economy and environment of rural communities. Opportunities to enhance project purposes through the national forest program are identified during the survey, and management direction is provided for in report recommendations and plans.

Some of the direct local and national economic and social dividends derived from this program are: (1) protecting the land and its resources, including appropriate attention to natural beauty, water quality, and the environment; and (2) minimizing interference with the regular, ongoing Forest Service land protection and management activities.

To achieve the optimum development and use of a water development project frequently requires that scientifically designed treatment measures be applied to tributary lands. These land treatment measures benefit the quality and quantity of water inflow to the reservoir; they enhance the scenic and other public use values; and they prolong life by reducing reservoir siltation.

Other treatment measures, such as reservoir sweeping and debris removal, which provide a safer and more attractive environment for the reservoir user and reduce reservoir maintenance costs, are also performed under the Forest Service water related program.

During fiscal year 1971 environmental impact survey work, liaison with the water development agencies, and the application of land and reservoir treatment measures were carried out at 476 water resource development projects as compared to 546 projects for 1970.

Water rights

Competition for National Forest water resources is becoming more and more critical particularly in the West. It is therefore important that the Forest Service fully inventory the National Forest water uses and needs. During the past 6 years, an inventory has been undertaken of the present and future

needs for surface and subsurface water on national forests and national grasslands, primarily on lands reserved from the public domain. The data are necessary in promoting the development of all resources where water is required to meet the needs of the public on national forests for uses such as recreation, timber production, municipal needs and administration. The survey was about 80 percent complete on approximately 154 million acres of reserved lands at the end of calendar year 1971. States are being notified of these national forest water uses and needs, as an aid in planning and developing their own programs.

- **Develop and promote national programs that meet the Nation's need for timber.**

Production from National Forests

Volume of timber harvested in fiscal year 1970 totaled 11.5 billion board feet, which was 85 percent of the annual allowable cut of 13.5 billion board feet. In fiscal year 1971 the volume of sawtimber and convertible products harvested was 10.3 billion board feet, or 76 percent of the annual allowable cut.[1] The fiscal year 1970 timber harvest was down 0.3 billion board feet from fiscal year 1969. The fiscal year 1971 timber harvest was 1.2 billion board feet below the 1970 harvest and 1.8 billion board feet from the record 12.1 billion board feet harvested in fiscal years 1966 and 1968. The decrease reflects the effect of the tight money market on housing construction. Timber sales receipts in 1970 were $283.9 million, down $22.9 million from the record high of $306.8 million recorded in fiscal year 1969. In 1971, timber sales receipts were $217,035,000. 1970's sales totaled 26,610 for a volume of 13.4 billion board feet of timber. In 1971 there were 23,243 sales with a volume of 10.6 billion board feet of timber.

In addition to harvest of commercial timber, 640,955 Christmas trees were sold from national forests in 1970 and sales of numerous other miscellaneous forest products, such as boughs, greens, ferns, cones, and seedlings, brought in over $58,000 of the timber sales value. In 1971 644,691 Christmas trees were sold from National Forest lands. Other miscellaneous forest products sales netted $58,907 of the timber sales value.

Besides these sales, in 1970, 179.4 million board feet of timber valued at $332,743 was granted free of charge to 94,136 individuals under the Secretary's free use regulations S–26 and S–27. Comparable figures for 1971 were 190.3 million board feet of timber valued at $761,025, granted to 104,290 individuals.

President's advisory panel on timber

As a sequel to the June 1970 order by the President requesting the Secretary to formulate plans to improve the level and quality of management of forest lands under his jurisdiction to permit increased harvest of softwood timber, a blue-ribbon study panel was named in late 1971. Appointed by the President were Frederick A. Seaton, former Secretary of Interior; Stephen H. Spurr, president of the University of Texas; Marion Clawson, representing Resources for the Future, Washington, D.C.; Ralph D. Hodges, Jr., Washington, D.C., National Forest Products Association; and Donald J. Zinn, zoology professor at University of Rhode Island, and past president of the National Wildlife Federation.

This President's advisory panel on timber and the environment must make recommendations on such matters as desirable level of timber harvest on Federal lands, methods of accomplishing it while insuring environmental protection, costs and benefits of alternative forest management programs, citizen involvement, timber sales procedures, and possibilities of increasing timber productivity on non-Federal lands. A report on the panel's findings is scheduled July 1, 1972.

Forest management practices studies

To improve National Forest management, the Forest Service in 1970 and 1971 conducted a series of three regional and one national study of forest management practices.

Two of these, completed in 1970, involved the Bitterroot National Forest of Montana and the Monongahela National Forest of West Virginia.

In 1971, new management directions for these two forests took the form of environmental impact statements to the Council on Environmental Quality. (The Monongahela actions are described in the section of this report dealing with environmental impact reports.) Like the Monongahela report, the Bitterroot report involved some criticism

[1] In previous Chief's reports the annual allowable cut did not include convertible products west of the Great Plains. This change in reporting procedure is because of the gradual increase in use of convertible products west of the Great Plains.

of forest management actions but it did not find a disaster as some critics have suggested.

A number of specific directions were ordered as a result of the Bitterroot report, including: More selective use of clear-cutting, modification of the size and nature of clear-cuts, banning of terracing on slopes over 30 percent, reduction of road mileage, and intensification of multiple use planning.

Reports were completed in 1971 from a study of the forests of Wyoming and from a nationwide review. Actions on recommendations were still being formulated at the end of the year.

In the case of the Wyoming report, some of the remedial actions suggested for problems had been initiated several years before. Clearcuts had been reduced in size and shaped for more natural appearance. Reforestation efforts had been intensified. Regional foresters from the two regions involved (Rocky Mountain and Intermountain) immediately responded to report recommendations with listed commitments to improve resource inventories, do more comprehensive planning, improve public involvement and obtain more effective effort and better balances in timber-related management activities.

A multidisciplinary team visited every Forest Service region to prepare a comprehensive nationwide silvicultural review. The study involved 39 forests representing every major timber type. Changes in policy and practices indicated in 30 recommendations resulting from the study will be adopted.

Among key situations to be worked on are identification of areas where timber harvesting will be discontinued or deferred because of difficulty in assuring adequate regeneration, exclusion from allowable cut the base areas that cannot be harvested within acceptable environmental quality standards, improvement of supervision, enforcement of road building standards, and all other aspects of timber sale operations.

At the end of 1971, an action plan to treat the 30 problems identified in the national silvicultural review was in initial stages of development.

Nation's timber inventoried

A new appraisal of the Nation's timber situation and outlook for the future was started. In effect, it will update two earlier studies on the subject—"Timber Resource Review of 1952" and "Timber Trends in the United States, 1962." Basic statistics are now available and a full analysis will be completed in 1972.

A new look at trends in timber supplies and demands is needed to help determine how best to meet the Nation's expanding markets for forest products and other forest land uses. This study will provide a basis for judging the effectiveness of current forestry programs and the needs of a private forest industries and forestry programs of Federal, State, and private forestry groups.

Incentive programs

Development of an incentives program to improve forest management on nonindustrial private ownerships in the United States was proposed by the Forest Service in 1970. State foresters, landowner forestry associations, industry representatives, and college and university staffs reviewed the draft and offered constructive suggestions that were incorporated in the modified proposal.

Research results cited

Intensive culture of sycamore. Sycamore responds well to intensive culture on good hardwood sites in the South. Current studies indicate that two to five times more yield per acre can be obtained from intensively managed plantations than from natural forests. Genetic improvement is very promising, particularly in combination with intensive culture.

Photos from space. Existing space exploration programs provide an unusual opportunity for the development of forest resource information systems based on remote sensing. Using standard aerial photographs coupled with ground measurements, a four-stage sampling procedure was used to estimate timber volume on a western national forest with a sampling error of only 7.5 percent. In a further development, Apollo 9 photography and imagery were used in an expanded sampling procedure to survey 12 million acres of land in the Southeastern United States at a very low cost per acre.

Two timber culture guides. Two guides designed for field use were developed that summarized available information on the silviculture of important forest types in the Northeast. A guide on northern hardwoods covers procedures for diagnosing silvicultural needs and applying appropriate treatments under even- and uneven-aged systems of timber management. A guide for paper birch provides suggestions on management for

esthetic purposes and recommendations for timber management.

Timber knowledge improved

Root rot. Thinning as a management practice in southern pine has caused serious losses from a root rot, *Fomes Annosus*. If thinning is done during the hot summer months, the high temperatures on the surface of freshly cut stumps will destroy the infectious fungus spores. Promotion of this practice throughout the South and Southeast would substantially reduce losses with minimum damage to the environment.

Longleaf pine. The prolonged "grass" stage of longleaf pine seriously delays plantation development. Genetically, inherent resistance may be developed to overcome this condition; other means of eliminating the delay would be helpful. In-row preplanting fumigation of soil resulted in earlier height growth and increased overall growth after 5 years.

Oak trees. Spores carried by air from diseased oaks to healthy pine cause fusiform rust canker infection. The greatest concentration of spores occur near the ground and under the oak trees. Vegetation barriers between oaks and valuable pine plantations should screen out the rust spores and reduce damage.

Dwarf mistletoe. Clearcutting has been the only effective method of controlling most dwarf mistletoe outbreaks in the West. Recent studies of red fir in California indicate that both the percentage of trees infected and the intensity of infection increased significantly as the height of the understory trees increased. The study showed that the regenerating forest could reach an average 3-foot height before all the overstory infected trees must be removed.

Decay. Recently completed decay studies indicate a rotation age of 90 years for upland oak stands in Kentucky. Fire scars are the most important entry point for decay fungi. By increasing fire protection and selectively removing trees at age 90, the quality of the forest for recreation and esthetics can be preserved. At the same time, the forest will yield quality oak timber.

Foliage diseases are not considered among the most serious forest tree problems. Yet, they seriously set back production of seedlings in the nursery and survival of newly established forest plantations. In Oregon a new needle disease of Douglas fir plantations has been investigated. Disease symptoms have been defined and the climatic factors necessary for perpetuation of the outbreak have been delineated.

Beetle attacks

- The ability to foresee bark beetle outbreaks and take preventive actions is important to land managers. Beetle attacks disrupt the management of all forests. Beetle survival and the probability of continued or increased tree mortality in lodgepole pine stands can be predicted. Basis for prediction is thickness of the inner bark, in which the beetles feed, diameter of the tree, and elevation. Survival has been found to be much higher in trees with thicker inner bark than in those with thinner inner bark. At mid-elevations, lodgepole pines over 14 inches in diameter are the first attacked and killed.

- Insects cause severe losses of direct seeded western white pine in prescribed burn areas in north-central Idaho. Entomologists have learned that fall-sown, treated seeds are least affected by these insects, whereas spring-sown, untreated seeds are most susceptible to damage.

- Pine reproduction weevils are attracted to recently cut-over areas where they feed on planted seedlings. Three out of four seedlings can be killed. Applications of 1 percent concentrations of two compounds, fentin acetate or fentin hydroxide, will significantly reduce feeding. These feeding deterrents will protect seedlings in areas where planting follows extensive logging operations.

Forest Land Stratification Study

In late 1971 the Intermountain Forest and Range Experiment Station published the findings from a forest land stratification study designed to provide methods for classifying national forest lands for their best use. The station analyzed timber data and the data-gathering process of six National Forests—one in each western region. The study concluded that new means are necessary to improve information gathering that will meet the increasing complexity of setting up coordinated management programs for national forest lands. It examined possible methods that might be used to determine if proper consideration is being given to watershed and wildlife habitat protection, recreation, and other values in setting up timber management plans.

Based on the study, indications are that the acreage of forest land suitable and available for

timber growing on the national forests studied is somewhat smaller than previously estimated. Recommendations made in the study are being distributed to Forest Service land managers for consideration in setting up their own guidelines.

• Help insure mineral development with adequate protection of surface resources.

The National Forest System contains many areas having mineral potential. Under the general mining law of 1872, most of the lands in the system are open to mineral exploration and development. Almost every mineral activity must be monitored continually and supervised in order to avoid or mitigate, insofar as possible, damage to surface resources and to obtain a productive harmony between potentially conflicting uses.

Mining claims

In 1970, a total of 3,811 mining claims were examined for compliance with the mining laws; in 1971, this figure rose to 3,966. Additionally, management of surface resources was coordinated on 38,456 claims in 1970, and on 21,010 claims in 1971.

At the close of calendar year 1969, there were 85 mineral patent applications pending, involving 489 claims. Actions on 231 claims were completed during this period; 17 claims (five applications) aggregating 263 acres were patented during the calendar year. During the following year (ending December 31, 1970), there were 83 mineral patent applications, involving 450 claims pending, with actions completed on 243 claims. In calendar year 1970, a total of 71 claims (12 applications) aggregating 1,283 acres were patented.

Action in compliance with the Church-Johnson Mining Claims Occupancy Act continued. As of July 1, 1970, a total of 428 cases involved National Forest System lands. Of the 345 cases completed, fee title was offered in 61 cases, a lease offered in 123 cases, Forest Service special-use permits were issued to 11, and rejections made of 130 because applicants were not qualified under the law. As of July 1, 1971, the number of cases involving National Forest System lands had risen to 440, with a total of 361 cases completed. Of these, fee title was offered in 64 cases and a lease offered in 130 cases; 11 were issued Forest Service special-use permits, and 134 were rejected because applicants were not qualified under the law.

Total revenue from mineral leases and permits on National Forest System acquired lands amounted to $6,213,227 during fiscal year 1970, and during fiscal year 1971 came to $6,804,405. In addition, approximately $23 million in revenues from rents and royalties for leases and permits on National Forest System lands were received in fiscal year 1970, and $24 million in 1971.

Mine or well-head value of minerals produced from National Forest System lands during each of the fiscal years 1970 and 1971 is estimated to exceed $100 million.

Mineral leases and permits

Protection of the environment and coordination with other land uses was involved in supervising some 14,500 active mineral leases and permits in 1970 and 11,340 in 1971. Similar action involved nearly 3,000 sales and free use permits for common varieties of minerals and more than 800 mineral operations active under reserved and outstanding mineral rights, during fiscal year 1970. During fiscal year 1971, protection and coordination actions were needed on a total of 3,381 sales and permits on 997 mineral operations.

Mining and environmental control

Heightened public awareness of national pollution problems and of the need for constructive change has sharpened conservation issues between preservationists and miners. The finite land base involved cannot satisfy the legitimate needs and desires of both groups. The Department of Agriculture has previously suggested environmental control of mineral activities. The Public Land Law Review Commission in its June 1970 report recommended some basic changes in the 1972 mining law:

(1) Prospectors are to obtain a permit containing provisions for the protection of surface values.

(2) Lands disturbed by mineral activities are to be restored or rehabilitated.

(3) Appropriate Federal agencies are to have notices filed with them on all mining claims. This would give the agencies time to contact the prospectors and prevent poorly designed and located access roads being built and off-site damage to watersheds.

Environment actions taken

This report covers fiscal years 1970 and 1971. Actions included:

1. Equipment banned. The Forest Service issued orders prohibiting or restricting use of tracked vehicles and earth moving equipment on the Mount Moriah area in the Humboldt National Forest in Nevada and the White Clouds area in the Challis and Sawtooth National Forests in Idaho. The lands involved are highly scenic and fragile and susceptible to esthetic damage from mineral activities.

2. Mining in wilderness. Trespass action was threatened against parties who claimed mineral rights in the Boundary Waters Canoe Area of the Superior National Forest in Minnesota. Almost one-third of the area in this wilderness is encumbered by private mineral rights. At issue was whether or not the parties had the right to use mechanized equipment for prospecting. Before this could be determined, a conservation group filed suit to contest the validity of the mineral rights and to enjoin the Secretary of Agriculture, the Chief of the Forest Service, and the Forest Supervisor from granting the alleged mineral owners permission to enter and prospect in the Canoe Area. Mining is incompatible with preservation of the Canoe Area's primitive qualities, but until the mineral rights problem is resolved, the outcome of the contest between mining and wilderness preservation will remain in doubt.

3. Strip mining. In West Virginia, a conservation group filed a suit to enjoin a coal company from carrying out prospecting operations in the Monongahela National Forest. The suit would also enjoin the forest supervisor from issuing right-of-way and use permits to the coal company. The coal rights are owned by the coal company and the surface is national forest land. The plaintiffs charge that core drilling and roadbuilding are unlawful and unnecessary and that such activities will impair the wilderness qualities of the area. The preservationist group wants the area studied for inclusion in the National Wilderness Preservation System. Before the suit was filed, the forest supervisor had proposed a multiple-use plan that would divide the area into two back country units separated by a pioneer zone.

4. Copper mining. On the Custer National Forest in Montana, six mining companies conducted extensive exploration for copper-nickel deposits. Inadequately designed and poorly located access roads, discovery pits (required by State law) made by bulldozers, and inadequate erosion control caused siltation of streams and considerable damage to a fragile alpine environment. The Forest Service is working cooperatively with the companies to minimize pollution and is encouraging them to rehabilitate disturbed areas where possible. A detailed study of the area was initiated to develop management direction that will minimize further environmental degradation without unduly restricting essential mineral activities.

5. Phosphate mining. A Forest Service environmental impact study was made on a controversial proposal to issue a phosphate mining lease within the Los Padres National Forest in California. USDI prepared the environmental statement. The mine would lie on a flyway of the California condor at a point 15 miles from the Sespe Condor Sanctuary and 20 miles from the Sisquoc Condor Sanctuary. The mineral leasing laws entitle the applicant to a mining lease, but there is considerable opposition to its issuance because of unknown impact on condor habitat.

6. Oil and gas drilling. A Forest Service environmental analysis was made on the application for a drilling permit for oil and gas on the Ocala National Forest in Florida. The Forest Service analysis was used by the U.S. Department of the Interior to prepare the environmental statement.

7. Phosphate prospecting. On the Osceola National Forest in Florida, four permittees, Global Exploration & Development Corp., Kerr McGee Corp., Monsanto Corp., and Pittsburgh Midway, have made phosphate discoveries on permit areas and have applied for leases on 42,996 acres. The Forest Service has prepared an environmental analysis for the proposal. The analysis shows that the proposed activities would have a number of adverse environmental effects which cannot be avoided. In summary, these are:

- The near natural condition of approximately 28,000 acres of the Osceola National Forest will be disturbed and changed.
- The natural beauty of the area will be affected adversely.
- Some of the most severe effects of the operation will be to certain endangered species, i.e., Florida panther, American alligator, red cockaded woodpecker; and the Florida black bear with only 600 individuals left in Florida.
- Water quality will be affected.

● Air and noise pollution will occur.

The Forest Service definitely believes this is a major Federal action requiring an environmental statement. However, the Department of the Interior has taken the lead agency role for this case. The Secretary of the Interior is reviewing the analysis and has yet to make his decision regarding the environmental statement.

- **Promote high quality wildlife and fish habitat to insure a desired mixture of types and numbers for public benefit. Give special emphasis to the protection of rare and endangered species of native animals, fish and birds.**

Wildlife and fish habitat improvement is achieved through coordination of resource activities and by direct project work. Most of the direct project work is done cooperatively with State fish and game agencies. In 1970, about 43 percent of the total cost for direct habitat improvement projects was paid by the States under cooperative programs, and in 1971, this percentage had risen to 58. A total of 1,940,200 acres of wildlife and fish habitat, including 230,000 acres in 1970 and 284,000 acres in 1971, has been improved in the past 12 years. The latest survey indicates a need for an additional 6,500,000 acres of wildlife and fish habitat improvement.

Forty-seven species of wildlife and fish are classed as rare or endangered and 68 species are considered unique on National Forest lands. Unique species are those that have considerable local or national scientific interest, such as the osprey and coppery-tailed trogon. A special management plan was developed to provide a favorable habitat for the osprey in Oregon.

Although all rare, endangered, and unique species are receiving special attention, special management or management plans have been developed for 30 species. Another 56 plans are being considered. Of particular concern is the endangered Puerto Rican parrot, found exclusively on the Caribbean National Forest in Puerto Rico. By latest estimate its numbers are down to 25–30 birds.

Management of wildlife and fishery resources in the national forests is a joint responsibility between the Forest Service and the respective States, requiring a very close relationship between these agencies. The cooperative wildlife program is improving yearly and provides wildlife recreational opportunities for increasing numbers of forest visitors.

Management benefits

● Deer habitat on southwestern forest lands can be improved by maintaining forests openings and borders, thinning trees on overstocked sites, minimizing the amount of slash cleanup, reseeding ranges with a mixture of grasses, forbs, and shrubs, and allocating forage between deer and cattle.

● Cattle grazing and timber production can be compatible and complementary uses in southern pine forests if trees are not trampled or browsed. Minimal damage to pine seedlings and satisfactory calf production are obtained by providing adequate amounts of native and improved forage during the summer and by wintering cattle off the forests.

● Narrow clear-cut areas in the Appalachian forests had more birds during the breeding and late summer periods than did uncut stands, but fewer birds during winter. Analysis of bird habitats indicated that about three-fourths of the variation in bird populations was accounted for by a single variable—density of the understory.

● Clear cuttings in the southern Appalachians can be too small or too large for deer habitat. A 21 acre clear cut is a desirable compromise. Because they remain accessible to deer, heavy selective cuttings appear to have an important advantage over clear cuttings.

Condor survey

Special emphasis in the wildlife program in 1970 was directed toward the cooperative program with the Audubon society on the national eagle nest survey and the Sespe Condor Sanctuary in California. Annual surveys are made on national forest lands to determine the nesting success of the bald eagle, an endangered species. This information is sent to the Audubon society, and is evaluated along with data from other sources.

The Forest Service, California Department of Fish and Game and National Audubon Society, Bureau of Sport Fisheries and Wildlife, and others are cooperating to preserve another endangered species, the California condor. This bird is very intolerant of human activity, and there are about 50 in existence. Every effort is being

made to have this species continue as an integral part of the native wildlife in national forests in southern California.

- **Seek to expand opportunities for grazing and other use of public and private range resources that serve the welfare of local residents and communities.**

A study was initiated in 1970 to clarify the function of the Nation's natural rangelands, including woodland ranges, and analyze present alternative range management and development programs. A task force representing three Forest Service management areas—the National Forest System, cooperation with State and private owners, and research—is taking a FRES(H) Forest Range Environmental Study) look at the range. An analytical model has been developed and data have been assembled. Within limitations, the study will predict the outputs that can be produced on about 900 million to 1.2 billion acres of forest and range environment, both Federal and privately owned. The study is being carried on cooperatively with other agencies in the Department of Agriculture and Department of the Interior.

For this study, "range is considered as a variety of ecosystems within which many interactions occur, and which produce many outputs for the use and benefit of society." Identification and evaluation of these outputs are to be a part of this study. The study recognizes that range means not only livestock use, but also watersheds, scenic vistas, a home for wildlife, an ecosystem, and a way of life for America's cattle and sheep ranchers. Some of these values may exceed those of forage produced for livestock consumption.

The study hypothesis is that range is a national resource that has great social, economic, and environmental significance. The resource will become even more valuable as the Nation meets its economic and environmental goals.

Preliminary findings indicate that some radical changes can be anticipated in the structure of the Nation's livestock industry. Animal unit month targets could be met from much less land than is now being grazed. The analysis shows that the competitive position of eastern ecosystems in livestock grazing is strong and that an expansion in demand for livestock products (267 million animal unit months by 1980) could be met in the eastern and southern sections of the Nation. The growing demand for beef products has been met in part by increased use of feedlots specializing in concentrated feeding.

- **Promote adequate provision for the variety of forest recreation opportunities needed by the public.**

Visits increase

In 1971, America's recreation-seeking public spent 184 million visitor-days in the enjoyment of outdoor activities on the Nation's most popular vacation lands, the picturesque National Forest System. This record count was a 6 percent increase over the 173 million visitor-days tallied in 1970 and coincided with a corresponding increase in the capacity of developed sites and more intensive utilization of existing opportunities for dispersed area activities.

Approximately 40 percent of all National Forest recreation use occurs at special developed sites; campgrounds, picnic grounds, swimming, boating, observation, winter sports, visitor centers, etc. A total of 11,983 developed sites with a capacity of 1,316,347 persons at one time (PAOT) was under Forest Service management on June 30, 1971, compared to 11,417 sites accommodating 1,367,900 PAOT in 1970. Of the 1971 total, 732,802 persons at one time are accommodated in sites developed by the Forest Service. The remainder—583,545—have been developed and are operated by concessions (resorts, ski areas, etc.) authorized by special use permits. These concessions must adhere to strict stipulations to protect the forest environment.

Facilities developed by the Forest Service which will be needed to meet recreation demand without sacrificing environmental values should grow to 1,004,000 persons at one time (PAOT) capacity by fiscal year 1976. Accomplishment in this area in 1971 showed an increase of 10,138 PAOT capacity. However, this is still approximately only 1 percent of the 5-year objective.

Land managers met the increase in developed capacity and recreation use by trying to balance public recreation opportunities with public preferences, consistent with maintenance of environmental quality. Recreation planners recognize that the public wants a wide range of recreation activity and experience-level opportunities. These opportunities range from active to passive participation

and include both modern and primitive situations, demanding corresponding skill requirements for the user. Recreation planning on many national forests now follows a scale of conditions that describes and prescribes the existing and planned environmental benchmarks, modifies the resource from its natural conditions, and then summarizes the resulting experience-level opportunities.

Trends revealed

Although an increasing minority of campers prefer primitive, environment-oriented camping experiences, a much larger and increasing number prefer highly developed campgrounds. Most of these campers seek fun, recreation, convenience, and variety. They are willing to pay more and they expect more. For many people camping is more of a social than an environmental experience. When an intensively developed campground is designed, the social character of its use—such as accessibility and easy contact with other campers—must be considered.

With improved measurement of how many outdoor recreation visitors are doing what, when, where, and for how long, planning and management of recreation and other forest uses can be made more efficient and effective. Electronic axle counters, for measuring highway traffic, count vehicle axles entering and leaving sites, then print the net total number. These axle counts, related to sample counts of visitors, provide reliable use estimates. A self-registration procedure similarly related to sample counts is also precise and even less expensive to administer.

The fastest growing recreation activity is dispersed recreation use. Activities such as snowmobileing, hiking, and off-road vehicle use are growing in popularity. Although few facilities are necessary managers must still cope with the problems of cleanup, sanitation, law enforcement, conflicts of use and preventing environmental damage.

Data recording system used

More than 8,400 existing campgrounds, picnic grounds, and swimming, boating, and observation sites—some 500 more than in 1970—are now included in an automated directory information system called RIM (recreation information management). This provides the public with more complete and accurate information about national forest recreation opportunities—their location, fees charged, facilities, and services available—information which is updated annually. Some 40 publishers of commercial camping directories, guides, and road maps now use these data to provide a useful public service. Future directory service will include other kinds of developed sites as well as opportunities in dispersed activities.

Program accomplishments

Seventy-five percent of the measured job of administering 8,429 National Forest developed sites and dispersed use on the 186 million acres of national forests was accomplished through the 1971 camping season. Program emphasis was placed on the following objectives:

1. Operating and maintaining developed sites and dispersed areas to accommodate 184 million visitor-days use without jeopardizing the resource base or degrading the environment.
2. Providing National Forest visitors adequate protection from hoodlum-type activities.
3. Reducing vandalism damage.
4. Increased recreation fee collections, allowing a more intensively administered fee program. This resulted in fees collected in 1971 of $4,955,825, an increase of $1,234,596 over 1970.
5. Extending the recreation season to accommodate the growth in use of the National Forests.
6. Initiating a program to achieve compliance with Executive Orders 11507 and 11514, dealing with solid waste disposal and protection and enhancement of environmental quality.

Special use permits

The surface resources of the national forests not only provide timber, forage, water, wildlife habitats, and recreation sites but also valuable space much sought after by a wide range of group-oriented public users. In 1971, some 5½ million acres (5 million in 1970) of National Forest land were made available for this type of public use to some 70,000 permitted occupancy and special uses, under leases, easements, memorandums of understanding, and special use permits that contained specific authorizations and limitations. This use is increasing about 3 percent annually. Users include public and private enterprises representing individuals, corporations, churches, and city, county, State, and Federal agencies. Facilities include resorts, summer homes, youth camps, organizational buildings, and similar units. Rental fees from these permitted uses totaled $4,543,000 in 1971, up $510,840 over fiscal year 1970; proceeds are deposited in the U.S. Treasury.

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Each authorization to use these lands for such a defined public purpose contains strict requirements that guarantee the safety and welfare of air, soil, water, and other environmental qualities. The protection of natural beauty and environmental esthetics are prime considerations to land managers when deciding whether a certain authorized use is desirable.

- **Help meet the Nation's needs for wilderness and other special environments by carrying out scientific management of such areas and by developing classification alternatives that provide a variety of opportunities.**

The Wilderness Act of September 4, 1964, stipulated that within a 10-year period all primitive areas in the National Forest System are to be studied by the Forest Service and recommendations made as to their suitability for wilderness. September 4, 1971, marked the beginning of the final study period. As of June 30, 1971, the National Forest Wilderness Preservation System consisted of 61 wilderness areas totaling 9,932,967 acres and 27 primitive areas totaling 4,356,554 acres.

Of the 27 primitive areas, 16 reviews with recommendations are now before Congress and 11 reviews and recommendations will be presented to the President and Congress for consideration by September 4, 1974. These will complete the primitive area reviews.

In addition to primitive area studies being made to meet the 1974 deadline set by the National Wilderness Preservation Act, the Forest Service initiated a study in 1971 to review undeveloped National Forest areas over 5,000 acres. It was the first step toward regional recommendations to be made to the Chief of areas with wilderness potential. From these the Chief can select candidate areas for further study as possible wildernesses. The Regional Foresters' recommendations must be submitted to the Chief by June 30, 1972. The candidate areas selected will likely be announced by the first of 1973. The Regions are planning extensive public involvement, with public hearings, to determine the merits of their recommendations.

Thus, by December 30, 1972, the Forest Service will have selected all new areas to be studied for possible wilderness consideration.

Public input on management of Eastern wild areas

The Forest Service has invited suggestions from the public on ways to identify and establish areas in the Eastern United States having wilderness potential. The invitation is in response to the President's environmental directive to the Secretaries of Agriculture and the Interior to accelerate identification of possible Eastern wilderness areas. Public lands in the East are both less extensive and more heavily used than in the West. Much of the public land in Eastern United States is so marked by evidence of man's use that it does not meet the criteria of the Wilderness Act. The Forest Service, which administers much of the Eastern public domain, has requested written statements from interested individuals and groups suggesting alternatives for managing areas on Eastern National Forests with wild land values.

RIM program tested

A major objective of the RIM program previously described is to provide data for both research and management of the recreation resource. A new sampling technique was developed for measuring the use of classified wilderness.

The wilderness sampling technique utilizes statistical procedures developed by the Southeastern Forest Experiment Station. It was successfully pilot tested on the Rawah Wilderness in Colorado. The device uses a new battery-operated electric eye trail traffic counter developed by the Missoula Equipment Development Center.

Three study areas set aside

Three new natural research areas were set aside in 1971 for scientific study and comparison. This brings the number of such study areas in the National Forest System to 94, with a total acreage of 105,895. They are established for the benefit of scientists and visitors.

The Forest Service research natural area program began in the 1920's. First area selected was the Santa Catalina Research Natural Area in the Coronado National Forest of Arizona. Over the years, the program has grown to the present 94 areas. Reserved for scientific study of unusual or typical plant communities, soil or geologic formations, or animal habitats, these areas are located in 29 States and in the Commonwealth of Puerto Rico.

New programs started

Visitor Information Service increased its efforts to share its interpretive knowledge and expertise

with the States. For example, a 1-day seminar was held with State foresters and their staffs from seven Eastern States. The purpose was to explore ways in which VIS expertise in visitor services and interpretive media and techniques used on national forest lands could be applied to the visitor problems and needs on State forest lands.

A unique interpretive endeavor was begun in 1970 aboard the ferries of the Alaska Marine Highway System in cooperation with the State of Alaska. As the ferries ply the Inland Passage, naturalists conduct interpretive talks, provide information, and show films and slide programs on the natural environment of Alaska, particularly the forest resources and activities along the shorelines.

At Lake Tahoe, on the Eldorado National Forest, Calif., the Stream Profile Chamber in its first full year of operation in 1970 afforded over 100,000 visitors a unique underwater view of Taylor Creek and its ecology. In September 1970 the Sylvania Visitor Center, gateway to the Sylvania Recreation Area, Ottawa National Forest, Mich., opened its doors to visitors.

• Promote high-quality, sustained-yield, multiple-use management on national forests and other ownerships, where applicable.

Achievement of high-quality multiple-use management of National Forest System lands depends on certain implementing and facilitating projects and programs. Among these are:

- Identify and mark upon the ground the boundaries of all National Forest System lands.
- Determine and record for ready reference by land managers all title encumbrances and outstanding interests that restrict or hamper the administration of National Forest System lands.
- Obtain rights of access across non-National Forest System lands for the construction and maintenance of the forest development road and trail system.
- Work cooperatively with adjoining and intermingled ownerships to develop and maintain a transportation system that will serve the needs of owners.
- Resolve promptly all instances of trespass on, or claims to, National Forest System lands.
- Adjust title to land in cases where the United States has acquired an interest through mistake, misunderstanding, error, or inadvertence.

Land line location

Some 272,000 miles of property line, and 1,160,000 property corners delineate the boundaries between lands of the United States administered by the Forest Service and all adjoining ownerships. Many of these property corners were established 50 or more years ago and more than 30 percent have since disappeared through lack of maintenance. In 1958, a special program was initiated to search and remonument property corners and mark lines. This program has received limited funding.

During the period fiscal years 1958 through 1971, 11 percent of the total inventory of corners has been remonumented or found satisfactory. During this period 24,300 miles of property line have been marked to full or partial standard and 3,400 miles have been inspected and maintained. In fiscal year 1970, 13,976 corners were remonumented or reestablished and 450 were maintained. In fiscal year 1971 some 20,600 corners were reestablished and 3,500 maintained. During fiscal year 1970, 2,745 miles of line were located and 359 miles maintained. In fiscal year 1971, some 3,000 miles of line were located and 294 miles maintained.

Accurate, readily available records of landownership and status go hand in hand with adequately marked property lines as essential tools in proper management of land. In 1960, the status conversion project began in earnest. The completed record will involve 17,000 townships; 1,660 townships were completed in 1970 and 1,350 in 1971. The job is over 75 percent finished and scheduled for completion by the end of fiscal year 1974. Records will then be placed on a current maintenance basis.

The land line location and status programs have revealed numerous instances where the United States acquired color-of-title in land through mistake, error, or inadvertence. Public Law 120, the act of July 8, 1943, as amended, authorizes the United States to take corrective action in such situations. During fiscal year 1970, 28 quitclaim deeds (22 in 1971) were signed and delivered to the rightful owners.

Road rights-of-way

Rights-of-way were obtained for 1,292 miles of existing and planned forest development roads in 1970 and for 972 miles of similar roads in 1971. In addition, work continued in developing and implementing cooperative agreements with private landowners to permit joint construction and use of road systems to serve intermingled private and National Forest System lands. During fiscal year

1970, 17 new agreements were signed and 75 supplements of previous agreements were negotiated. These covered 501 miles of existing roads and 161 miles of road to be constructed. In fiscal year 1971, 16 new agreements and 69 supplements of previous agreements were negotiated, covering 758 miles of existing roads and 128 miles to roads yet to be constructed.

After Forest Service approval the Bureau of Public Roads (Department of Transportation) issues easements to States for rights-of-way for Federal aid highways across National Forest System lands. During fiscal year 1970, 99 such cases were completed (87 in 1971).

Transportation system

The Forest Service initiated a project to study new methodology and technology in transportation planning for systems that serve resource management activities. During 1970 substantial progress was made in developing models for transportation system analysis. The objective of this study is to facilitate the orderly planning and development of natural resources and to avoid crash management situations. Findings already point to a need for better data for resource planning decisions if the Forest Service is to serve the present and future needs of people.

Development planning for forestry equipment has been changed to make the program more responsive to multiple use action programs. This has been accomplished by more preliminary planning and analysis with greater emphasis on program flexibility.

• Protect all public and private forest resources, commensurate with the values involved.

The Forest Service is trying to develop interdisciplinary approaches to both long- and short-range planning, and to improve coordination between functional interests. As a first step in improving the annual work planning process, the "Chief's Program and Work Planning Advice" for fiscal year 1972 was published in November 1970. This replaced the "Chief's Program of Work" of previous years and included preliminary financial planning advice as well as coordinated program direction to Regional Foresters and directors. "Chief's Program and Work Planning Advice" was distributed some 4 months earlier than similar advice in previous years to provide timely national guidance and coordination for field units to use in their planning processes.

Increasing problems of public safety, vandalism, and protection of the environment have prompted another appraisal of the entire law enforcement job related to the National Forest System. A year-long study was made. The study team: (1) reviewed the volume and complexity of law enforcement and trespass in the Forest Service, (2) identified responsibilities and authorities of both the Forest Service and State and local law enforcement agencies, and (3) recommended actions to meet Forest Service responsibilities, such as training, organization, and policy.

The study report has been submitted to Regional Foresters for their reactions and recommendations.

New program plans

The development of a new national program plan—Environmental Program for the Future—has been initiated with field participation. Phase I has been completed, and phase II is scheduled for completion by March 1972. This will be a balanced program with full concern for the quality of the environment. Public demands in the natural resource sector for research, State and private activities, and National Forest System outputs (timber, recreation, water, forage, wildlife, and esthetics) during the decade ahead will be blended with the required inputs and on-the-ground conditions to produce an optimum program that best meets the needs of the Nation. This will be a viable plan which will be modified over time, as necessary, to best serve the public.

Special studies, such as the pest control Zectran project, State and private forestry incentives program, and recreation studies were undertaken to examine the contributions toward objectives and the outputs or results in relation to the costs. Through special studies, management is better able to (1) modify, expand, or contract various efforts, and (2) allocate scarce resources between programs and geographic areas in order to best serve the public.

A steering committee and development team is being formed to develop a better interdisciplinary program planning process. The improved process will allow management to make better decisions based on improved information concerning expected resource use, relative value of outputs and end results, productive capability of the land and its people, environmental standards, and costs.

Help Protect and Improve the Quality of the Open Space Environment in Urban and Community Areas

- Extend research efforts to establish the base of knowledge and techniques necessary to better establish, protect, and maintain trees and related vegetation to improve environmental quality in urban and community areas.

Biological controls

Forest disease and insect control activities were closely coordinated with States, Federal agencies, and individual owners in 1970 to aid the Nation in the protection of forest resources from pest depredations. Also, the impact of smog damage on trees in California and the effects on vegetation of hydrogen fluoride from an aluminum plant in Montana are being measured continually as the Forest Service improves the detection of pests and pollution.

During the 1970's cultural and biological control measures will be applied in every possible instance to control forest and insect disease outbreaks. Efforts will be undertaken to reduce and eliminate control measures that are deleterious to the environment. Aiding in this effort is the Forest Service Pesticide Use Coordinating Committee, which completed its first full year of operation in 1970.

Zectran approved for forest pest control use.

A highly selective, nonpersistent chemical substitute for DDT to battle the spruce budworm and the jack pine budworm has been approved for registration by the Environmental Protection Agency. These insects have caused extensive environmental and ecological damage to North American forests. A survey by the Forest Service shows 5.7 million acres of U.S. forest lands damaged by the budworms.

Zectran was selected from a list of 130 chemicals, and extensive research, field tests, and control studies were conducted from 1964 to the present before it was accepted. The success of this chemical may open doors for testing it against other serious defoliators, including the gypsy moth.

Forest greenbelts

Proposed Public Law 566 projects, including communities now expanding rapidly into forested areas, continue to be planned to fully utilize, maintain, and improve the existing forest land cover of trees, undergrowth, and ground plants. Wherever appropriate, technical forestry assistance is provided to install protective measures and assist urban and rural community leaders in planning beneficial measures such as forest greenbelts and buffer strips. This type of assistance is currently being carried out on six small watershed projects. Plans are being made in 18 States for additional urban forestry assistance.

State forestry agencies in Missouri, Georgia, and several other States are providing forestry service to communities, organizations, and individuals in metropolitan areas. Among the services provided are consultation with the absentee owners of a large portion of the Nation's privately owned forest lands, assistance in the care and maintenance of open space areas and parks, and advice in the maintenance and protection of greenbelts, buffer strips and shade trees.

Wildfire prevention

People building homes in forested areas that were considered remote only a few years ago have increased the fire hazard and risk of these areas considerably, as proved by the increase in man-caused fires. Fire suppression forces are being taxed to their limits by these wildfire emergencies. New methods and equipment are being developed cooperatively by the States and the Forest Service to assure more complete protection for communities that face these problems.

More intensive fire prevention measures have been taken along with better and faster control efforts. Fast initial attack forces were trained by several States and stationed at strategic locations to attack fires while still small in order to keep them small. Increased use of aircraft is being made, especially in detection efforts. States have used prescribed burning and other fuels management to keep pollution to a minimum. As a result, wildfires pollution of our atmosphere, streams, and lakes

with ashes and other debris will be reduced. Studies into development of better locomotive fuels and better maintenance of railroad rights-of-way are being made to reduce the number of fires caused by railroad operations. Many States have intensified their efforts in this area and have included more effective law enforcement programs.

Some special efforts in fire prevention have been made in several States. The expanded pilot fire prevention project in California known as Operation Headstart reaches children at the elementary school level. Florida has produced two new fire prevention training films and the Northeastern Area State Foresters another. Georgia's metro foresters assisted in weekly 5-minute color television conservation programs. Kentucky has a special project to eliminate unsightly fire-causing dumps. The contractor program in the pilot-test area of Louisiana to help reduce incendiary fires is continuing and has reduced fires in the area by 34 percent. South Dakota has a similar contractor program in high debris fire occurrence areas. The personal approach is being added to other State programs.

Smokey Bear adopts successor

Smokey Bear, the Nation's popular symbol for cooperative fire prevention efforts, acquired an heir in November 1971. Smokey and his wife Goldie adopted a 1-year-old bear cub, named "Little Smokey," who lived on the same National Forest from which Smokey came over 20 years ago. Little Smokey has taken up residence with his father and mother in the National Zoo in Washington, D.C. In case anything should happen to Big Smokey, his adopted son will head up the Nation's most successful fire prevention program.

Disease research

1. A photo guide has been widely distributed to assist foresters and forest workers in estimating the extent and severity of discoloration and decay inside northern hardwood trees. The quality and quantity of wood logs can be accurately determined through identification of external signs that indicate internal wood conditions.

2. A previously unexplained tipburn of ponderosa pine near Denver, Colo., was found to be related to high sodium and chloride accumulation in the needles. In nature, the important sources of the salt and thus, of the problem, appear to be saline water from wells, lakes, and natural seeps.

3. Introduction and spread of the Dutch elm disease in the urban environment is accomplished by control of feeding. Two primary feeding stimulants, lupeyl cerotate and catechin xyloside, have been isolated and identified by biochemists at Ohio State University in cooperation with entomologists at the Delaware Laboratory. Now the search is turning to chemicals that will mask these stimulants or repel feeding.

4. Hard pesticides contaminate the air, water, and soil, or enter the food chain. Many years ago Forest Service scientists started studies on how cholorinated hydrocarbon insecticides move in soil. Aldrin, chlordane, dieldrin, and heptachlor, when applied to the soil to control subterranean termites, have moved only a few inches after 10 to 20 years of weathering in south Mississippi. This shows that contamination does not spread from the treated areas.

5. Scientists working cooperatively at the New York State College of Forestry and at the Forest Service Laboratory at Delaware, Ohio, have found that beetles of both sexes are attracted to elm material infested with virgin female beetles. A powerful attractant, produced by the females as they tunnel into the bark, stimulates massive attacks. Scientists plan to isolate and identify this natural attractant and to use it in manipulating insect populations.

- **Promote and develop cooperative arrangements designed to assure adequate use of forestry skills and techniques in improvement of the urban environment.**

Nicasio. An interdisciplinary, basic land-use planning guide was made for the development of Nicasio Valley—a 36-square-mile mountain valley soon to be part of San Francisco's suburbia. At Nicasio, a team considered the total complex and together studied the many land-use problems and their interrelationships—geology, hydrology, ecology, engineering, wildlife, climate, and landscape design. The result was a planning package which will give simultaneous consideration to the many interrelationships and their impacts.

Noise level reduced. During the past 30 years the average community sound level has risen an estimated 1 decibel per year—an eightfold increase in total loudness. Preliminary results of research in cooperation with the University of

Nebraska indicate that tree barriers can reduce apparent loudness by 50 percent. Screens of trees and shrubs have a great potential to reduce noise level and improve environmental appearance.

The report released in July of 1971 is designed to provide information which can be used by landscape architects, horticulturists, and nurserymen in determining proper placement, heights, and widths of tree and shrub belts. This information should assist in achieving good noise filtering for parks, picnic areas, housing developments, etc., from highway and industrial noises.

Generate Forestry Opportunities To Accelerate Rural Community Growth.

- **Work with all appropriate public and private agencies to provide public services, income, jobs, and amenities in rural areas through planning, resource management, economic development, and manpower programs.**

A major objective of the Forest Service is to improve the welfare of underprivileged members of society. To achieve this, the Forest Service has established a policy that it will use forestry activities to help minority, economically depressed, elderly, handicapped, and youth groups.

Youth Conservation Corps

Perhaps the most popular program with the public, the YCC was initiated in 1971 as a 3-year pilot program operated as a cooperative venture between the Departments of Agriculture and Interior. With the $2.5 million provided in the summer of 1971, the Forest Service employed some 2,670 young men and women, ages 15 through 18, on 64 projects operated by the two departments in 37 States, the District of Columbia, and American Samoa. The youths accomplished conservation work and environmental improvements to public lands valued at nearly $2 million, received approximately 500,000 hours of learning experience in natural resource conservation and environmental education directly associated with work program accomplishment, and developed a greater understanding and appreciation for social needs and problems by working, learning, and living with fellow Corps members from various social, economic and ethnic backgrounds. With $3.5 million to be provided for the 1972 summer program, the two departments plan to operate 95 projects in 48 States, the District of Columbia, and American Samoa, involving some 3,000 youth members.

Job Corps civilian conservation center program

Through an agreement with the Department of Labor, the Forest Service operates 20 civilian conservation centers for disadvantaged young men, ages 16–21. With a one-time capacity of 3,848 youth, these centers provide education, vocational training, and social living skills to about 8,000 enrollees each year. In addition, value of work accomplished on national forests is valued at approximately $5 million annually. Total placement in jobs of graduating corpsmen was 76 percent during last year.

An important breakthrough made by the Forest Service was in obtaining agreements with five construction unions to train corpsmen in the CCC's. About one in three corpsmen are now enrolled in these union training programs. Of the corpsmen completing the training, 94 percent were placed in jobs. Since the inception of these cooperative union programs, 1,645 disadvantaged youth, many of minority groups, have been placed in permanent jobs with these trades. Major problems in administering the Job Corps program is the funding received from the Department of Labor. The Forest Service in fiscal year 1972 operated on reduced appropriations—about $200 per corpsman man-year less than in 1971. This does not include further reductions in available funds resulting from the pay raise and implementation of the President's economic policies.

Uses of closed conservation centers

Of the 25 closed civilian conservation centers formerly operated by the Forest Service up to 1969, most are being utilized by State, city or community bodies for educational, correctional, or other socially useful programs. Users are operating most of these centers under Forest Service special use permits. Facilities and land at several of these closed centers have been transferred to

States and community action bodies through donation procedures as a result of reporting them through excess property channels. As a result, donation assignments have been made by the Department of Health, Education, and Welfare to the user at no cost. The socially oriented uses of these closed facilities should stimulate the growth of several rural communities.

Other manpower and youth training programs

In cooperation with Labor and other departments, the Forest Service hosts an estimated 8,000 enrollees each year in other programs for disadvantaged youth, adults, and senior citizens. Participation in calendar year 1971 increased by nearly 50 percent in the Neighborhood Youth Corps, and by about 18 percent in college work-study over calendar year 1970. Each Forest Service region has been assigned minimum goals for support of these programs which include Operation Mainstream, Green Thumb, Manpower Development and Training Act, supplemental training and employment program, and similar antipoverty efforts.

Civil rights

In late 1970, the Forest Service appointed a civil rights coordinator to oversee its efforts in improving delivery of programs to minority groups. The coordinator has personally visited every region, station, and area to review progress and coach field personnel. During the last quarter of calendar year 1971, Forest Service personnel conducted 724 compliance reviews. The number of contracts awarded to minority owned corporations has been increased and permits have been issued to minority individuals for grazing, timber products, and other services, and products from the national forests. At the beginning of 1971, in excess of 30 school districts eligible for receipt of the 25 percent revenue sharing fund from Forest Service receipts were in noncompliance. As of November 1971, all these school districts were in compliance. The Forest Service plans to continue to intensify its efforts to assure that minorities share equally in the benefits of the national forests.

Resource conservation projects

Forest Service involvement in resource conservation and development projects (R.C. & D.) continues to expand. During 1970, working through State forestry organizations in 38 States (42 States in 1971), accelerated technical assistance on forestry-related measures were provided to 42 operational projects (65 in 1971), throughout the Nation. Through the concerted efforts of 50 State service foresters (75 in 1971), 4,500 woodland owners (6,750 in 1971) were assisted involving nearly 160,000 acres of woodland (245,000 in 1971). Foresters marked 20 million board feet of timber (30 million in 1971) for harvest, thus providing about a half million dollars in stumpage values (three-quarters of a million in 1971) to communities throughout rural America. Other forest resources are not being neglected.

Additionally, nearly 400 woodland owners (600 in 1971) were given assistance in the field of recreation, grazing, wildlife management, water conservation, and in the utilization of special forest products. Over 5,000 acres of woodland (7,000 acres in 1971) were placed under protection from erosion, fire, insects, and disease, and grazing damage. Nearly 4,000 acres (6,000 in 1971) were planted to trees. These accomplishments were performed over and above those recorded under all other Forest Service-State forestry programs, in response to work measure priorities established by local citizens who serve on project committees. Increased local interest and involvement combined with technical expertise provided by service forester staffs insures even greater benefits on R.C. & D. projects during the coming decade.

- **Identify and promote opportunities for community development, including new towns, and insure that Forest Service programs contribute fully to their growth.**

The Forest Service provided staff work for USDA representative to the community development trust fund subcommittee connected with the working groups on rural development and national growth policy. This group is exploring with other Federal agencies the prospects for development of new towns and the use of Federal lands in such development.

About 18,000 farming and ranching operations depend in varying degrees on National Forest System rangelands to maintain their existence as economic enterprises. All are family-type operations—most of them small; they provide the basic economic framework for many small rural communities throughout the country. These farms and

ranches grossed an estimated $170 million from the sale of livestock products in 1970, generating an estimated $300 million of household income in rural communities.

Visitor information services

Generally, Forest Service Visitor Information Service (VIS) facilities are located in lightly populated rural areas. The impact of these installations can sometimes create problems as well as economic opportunities for adjoining small rural communities. Advance planning of construction and consideration of the community in the plans can be helpful in alleviating potential problems and needs of these rural areas.

An example of such planning is the current development of the Blanchard Springs Caverns area in the Ozark National Forest. On their way to and from the caverns, hundreds of thousands of visitors are expected to visit the town of Mountain View and the remainder of Stone County, Ark., which is currently economically depressed. Early in the planning for this visitor program, the Forest Service recognized that an orderly plan of development for community services and facilities was needed. As a result of Forest Service efforts, county, State, and Federal agencies, economic development districts, and rural development personnel coordinated their efforts to bring technical services and support to the town and county to provide orderly development. Consideration of local communities in developing interpretive areas will play an increasingly important role in the planning process for Visitor Information Services.

Tree seed collections

In 1970, Forest Service nurseries at 13 locations produced 97.3 million trees; extractories processed 13,869 pounds of clean tree seed from cones purchased largely from local people. An additional 434 pounds of clean seed were purchased from tree-seed companies or other producers. The collection of cones and fruits to provide tree seed is an important income source for many rural communities.

An additional 288 acres of seed orchard and 97 acres of seed production area were established. The proportion of nursery stock grown from seed produced in seed production areas continues to increase.

In fiscal year 1971, 12 nurseries produced 98.7 million trees; Forest Service extractories processed 21,656 pounds of seed; 577 pounds of clear seed was purchased; 245.2 acres of seed orchard and 21 acres of seed production area were established.

Medicinal and decorative plants

The incomes of many Appalachian region families are augmented by the collection and sale of medicinal plants. A new handbook published by the Forest Service describes 126 species of such Appalachian plants. The handbook includes information on plant collection and preparation as well as reputed and recognized usages. Another Forest Service publication describes the decorative forest trees and plants of the Appalachian region. Elsewhere in the United States, the collection of medicinal plants and florist greeneries, as well as the growing and harvesting of Christmas trees, have become important minor industries in rural areas.

- **Seek opportunities for development of forest-based enterprises which will contribute to rural growth rates at least equal to the national average.**

Recreational opportunities

Forest resources are important to the economy and environmental quality of many communities in rural America. Forests and associated open lands provide useful commodities, many kinds of outdoor recreation, clean water for domestic and industrial use, wildlife, and forage. Improved utilization of wood and forage resources also provides opportunities for rural economic development.

Foresters have made significant contributions to rural development in terms of forest resource planning in harmony with local plans and objectives, and in industrial and business development that created new jobs and economic opportunties. Technical advice has been provided on many forestry and related subjects where communities needed this help. Forest development and management practices have been designed to improve the quality of environment and natural beauty of rural areas.

In the Rocky Mountains, the growth of several rural communities has been associated with ski developments on National Forests. Aspen, Colo., a former mining town in the Roaring Creek Valley, is an example. In the late forties, Aspen was a

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dying town with a few hundred people. During the next two decades, four ski developments were opened, representing millions of dollars of investment. In 1969, the four areas had 35 lifts and 831,000 skiers and are still growing. The population of Aspen has expanded to over 1,100. New houses and condominiums are becoming the core of new communities; they have increased the population by another thousand. In addition, there are over 14,000 tourist beds available in the valley. This is a dramatic illustration of how full development of a resource can stimulate the economic development of an isolated area.

In Colorado, Utah, and Nevada urban expansion is occurring along the front range of the Rockies, Wasatch, and Sierra Nevada Mountains using national forests as scenic backdrops and tying directly into the recreational potentials of the mountain forests. Developments are expanding as new cities and urbanization spread out from existing communities.

Naval stores

During 1970, the naval stores conservation program stimulated approved naval stores practices on some 7 million trees (7.3 million in 1971) on 735 turpentine farms (727 in 1971) resulting in healthier, more thrifty forest stands in addition to providing cash income from the naval stores operation. The Federal cost-share was $289,000 ($377,000 in 1971). Expanded application of research findings will help maintain and even increase production in a pioneer industry where a decreasing available labor supply had jeopardized future production.

Watershed projects

Watershed projects started as long as 25 years ago are demonstrating the wisdom of carefully planning area or regional programs to restore nonproductive lands. Solving soil and water problems, as for example by the use of forest plantations, not only improves the environment but provides a resource base for rural community growth. Older plantings that reach demonstrational age during the coming decade will be used to tell the story of the use of renewable resources.

Forest-based industries

Through a cooperative Federal-State program, 1,187 technical assists were provided in 1970 (1,329 in 1971) to establish new forestry-based industries or to expand existing industries.

Federal and State forestry personnel investigated and reported on feasibility of new or expanded wood-processing plants needed to use local raw materials and furnish products and employment. Examples are feasibility studies for a sawmill and pallet plant in eastern South Dakota, and an operating post peeling plant in Holmes County, Miss.

Plywood research on growth potentials of the softwood plywood industry using linear programing analysis indicated that the Southern States are likely to provide more than one-third of the Nation's plywood in the 1980's. Important factors in this analysis included competition with other building material industries and relative costs of manufacturing and shipment to national markets.

Cooperatives. Research on forestry cooperatives has provided guidelines that can aid timber owners and operators in rural areas in organizing and operating forestry cooperatives. Group enterprises can help provide more efficient harvesting, processing, and marketing of logs, pulpwood, and other forest products.

Short logs. A short-log processing system coupled with a computer program for process control has been devised to provide a more efficient and profitable method of obtaining short length lumber products and pulp chips from very low grade hardwood logs. A mill design was developed and economic analyses were made to show how these techniques can be used to convert low-grade oak and hickory trees into pallet products.

Particleboard. The Tennessee Valley Authority has developed a process for crushing low-quality hardwood logs and branches into strands. Forest Service research has produced a unique particleboard from this material. A possible large-volume use for the particleboard is wall sheathing, although its decorative possibilities as interior paneling are also promising. Only half as much phenolic resin is required as is generally needed in conventional particleboard.

Wildlife opportunities

Recreational and other uses of wildlife on national forests continue to grow. In 1970, an estimated 39.8 million visitor-days were devoted to wildlife attractions on these forests—including hunting, fishing, and nonconsumptive uses such as photography and bird watching. Visitors spent an estimated $597 million in pursuing these activities, which benefited many rural communities. (This

figure is based upon average daily expenditures determined in the national hunting and fishing survey in 1965.) In addition, more than 10,000 miles of streams within the National Forests constitute "nursery" waters for the production of Pacific salmon, a popular species with both commercial and sports fishermen.

Rural landowners in the South can provide much-needed hunting grounds and, at the same time, derive income by pooling their small forest holdings and leasing the hunting rights. Hunters are willing to pay for hunting privileges on private land. Gross income for hunting leases usually ranges between $0.50 and $1 per acre. This also promises to be an important income source for ranchers in the Western States who, in effect, can merchandize the Western landscape by operating dude ranches and similar enterprises.

Rangeland returns

Feeding protein supplements to cattle on southern ranges as salt-cottonseed meal was less expensive than daily or alternate-day feeding of cottonseed cake. Low production, however, canceled the saving. Alternate-day distribution costs only about 60 percent as much as daily feeding. This method further improved cost-return relationships by increasing calf production 8 percent and weight of cull cows 70 pounds each.

Seeded ranges used in conjunction with native ranges can effectively increase productivity and income from ponderosa pine ranges in Colorado. Average weight of weaned calves was 33 pounds higher, and gross income per calf $8.95 larger from combined use of seeded and native range than from native range alone. Seeding requires an initial investment of about $8.50 per acre which can be repaid within 3 years as a result of increased grazing capacity.

Business and industrial development

Forestry activities have included cooperative timber activities, demonstrations, and training in timber and lumber production, and technical assistance in developing wood-using industries. Some examples:

- A Forest Service study enabled a manufacturer to install the first large shake plant in Oregon. This study also enabled a uniform building code to be approved. Forest Service efforts in arranging for approved inspection and certification service enabled the manufacturer to expand his marketing area from local sales to all the Western United States.
- Promotion efforts were made to attract an industry to harvest and process pine poles and posts from young pine plantations on the Shawnee National Forest in Illinois. Thinnings from the plantations will produce enough materials to support a new industry.
- A study of the feasibility of producing plywood in the Black Hills of South Dakota is now being completed. This study, at the request of the Western South Dakota Development Co., will show not only the economic feasibility of plywood manufacture, but also its economic and environmental impact on the entire area.

Encourage the Growth and Development of Forestry-Based Enterprises That Readily Respond to Consumers' Changing Needs

- **Foster competition and efficiency in the industries that channel forestry-based services, uses, and products to consumers.**

- Research on the timber supply and demand situation in the United States included surveys of some 45 million acres of commercial forest land throughout the Nation to obtain information on timber availability, trends in the timber situation, and the long-range outlook for timber supplies that could be made available under different management programs. Surveys in States such as South Carolina, Indiana, and Mississippi show substantial increases in timber volumes during the past decade and an improving base for expansion of the forest industries.
- Research on the processing of southern timber shows that output of lumber and net revenues at southern sawmills can be substantially increased

by adding chipping headrigs that produce both lumber and pulp chips. Such equipment also makes possible utilization of much smaller timber for sawmill operation and enhances the profitability of forestry activities.

- Because shipping boxes and crates are commonly made of woods with low natural resistance to fungi and insects, they have a very short, useful existence. Several 3-minute dip treatments in various wood preservatives will protect for more than 10 years wood boxes stored off the ground, in both a southern and a northern climate. These simple treatments should help small industries in rural America make a superior product, while reducing demand for wood.
- Forest industry's efforts to increase utilization of forest wood remaining as residues from the manufacturer of lumber and plywood have been boosted by converting this wood to chips suitable for use in pulp manufacture. A major problem has been deterioration of the chips while stored outdoors at the pulpmill. A laboratory preparation of "green liquor," an intermediary formed during the recovery of chemicals from pulpwood digestion, showed great promise for controlling microbial degradation in chip piles. Estimated potential savings could exceed $2 million annually.
- Growers of Christmas trees on both small and large ownerships are adversely affected by foliage diseases in their plantations. In Wisconsin, brown spot has reached epidemic levels in several Scotch pine plantations. The disease defoliates the infected trees, making them unsalable. The favored, short-needled varieties appear to be most susceptible. Chemical controls are being tested, but genetic resistance may be a more useful solution to the problem.

• Place a high value on the adequacy to the consumer of forestry products and services.

Through a cooperative Federal-State forestry program, 13,620 forest product operators and processors were assisted in fiscal year 1970 (14,481 in fiscal year 1971) in improving woods or plant operations or in locating markets, stumpage, or raw materials.

Forest Service and State forestry agencies are represented on State and local USDA rural development committees. In 1970, they devoted approximately 30,000 man-days (44,000 in 1971) of time and effort to rural development activities. Some 1,200 assists (2,200 in 1971) were provided to organizations in forest industry development.

The Nation's fastest growth industry—the manufacture of pine plywood—is bringing new vitality and income to the South. The first commercial plywood plant using southern pine was opened in Arkansas in 1964. Now there are 45 southern pine plywood plants in operation supplying about 25 percent of the Nation's output. Each of these mills represent a capital investment of from $2 to $4 million. About 8,000 new forest industry employees, and several thousand dependent service-oriented jobs stem from this dynamic industry, which has still greater growth potentials. Initial research work conducted by the Forest Products Laboratory helped establish the technical foundation for the manufacture of plywood from southern pine species.

Fire prevention saves industries

In 1924, 91,921 wildfires occurred on lands receiving organized protection. These fires burned 28,822,735 acres; $1,869,565 were spent in the protection effort. The intensification of cooperative fire efforts show that in 1970, by comparison, there were 101,455 fires which burned 1,540,676 acres. Federal, State, and private costs to obtain this level of protection and to suppress these fires amounted to $113,548,499 in fiscal year 1970. In addition, 20 deaths annually are attributed to wildfires occurring on State and private lands alone.

The reduction of burned acreace has encouraged the development of forest-based enterprises and has also assured an increasing supply of timber to meet current and future demands. The tremendous increase in use of wild land areas has led to the increased number of man-caused fires and burned acreage.

Seek Optimum Forest Landownership Patterns

- **Round out the National Forest System by land purchase or exchange where public ownership will advance public programs. Study and identify opportunities to add to, or eliminate, areas from the National Forest System to assure optimum land use.**

Continuing programs of land purchase and exchange and acceptance of proffered donations are carried on to adjust ownership patterns in the National Forest System. These adjustments create viable units for resource protection and management with special attention to environmental protection and enhancement and meet the widespread public demand for more adequate outdoor recreation opportunities.

Land purchases

In fiscal year 1970, a total of 157 tracts were contracted for purchase under authority of the Weeks Act using regular appropriated Weeks Act funds (127 tracts in 1971). These cases involved the acquisition of 17,702 acres at a total cost of $1,299,221 (13,320 acres at cost of $1,133,601 in 1971). The transactions involve lands suited to timber production and watershed protection in areas where national forest ownership needs to be consolidated or extended to facilitate these programs. Many of the smaller parcels, 20 or 40 or 80 acres in size, are purchases made at a price equal to, or nearly equal to, the cost that would otherwise have been incurred to survey, post, and mark the national forest boundary surrounding the property.

Lands primarily valuable for recreation are not included in the Weeks Act program since acquisition of such lands is financed under the Land and Water Conservation Fund Act program. During 1970, 318 tracts totaling 81,585 acres were purchased with L. & W.C.F. money (376 tracts totaling 80,690 acres in 1971). These are lands that have outstanding potential for environmental enhancement and development for recreation use including hunting, fishing, hiking, swimming, boating, wilderness enjoyment, etc.

Land exchanges, donations, transfers

During 1970, 183 land exchanges were approved in which the Federal Government received 126,185 acres and gave 89,535 acres in return (in 1971, 120 land exchanges were approved; 69,231 acres received; and 61,066 acres were given in exchange).

In 1970, the Forest Service received 17,816 acres by donation in nine separate gifts. The properties located in five States have an estimated value of $2,810,800 (in 1971, 417 acres were received in 10 separate gifts, located in eight States with a value of $165,541).

Over 19,000 acres (10,000 in 1971) of public domain were transferred to the Forest Service from the Bureau of Land Management (BLM). Much of this land was formerly in private tracts acquired by the Bureau through exchange. In 1971, approximately 22,000 acres were transferred to BLM for administration along with other lands under its jurisdiction in the Castle Peak area in Colorado.

In 1970, over 200 acres of airport property declared excess near Independence, Kans., were transferred to the Forest Service for use as a tree nursery in research related to the Great Plains Shelterbelt project.

Selection criteria were liberalized for State of Alaska lands up for selections under the Alaska Statehood Act. Applications for selections were resumed following an inactive period of over a year. The Department in 1970 approved 32,282 acres (an additional 10,000 acres in 1971) for which the State has made application. The State has authority to select up to 400,000 acres from the National Forests in Alaska. Progress in land selection is now expected to increase significantly.

Special Studies

Pursuant to Executive Order 11508, a detailed review was made of lands under Forest Service jurisdiction which lie outside the boundaries of National Forests and National Grasslands. A report was made to the President's Property Review Board regarding the degree of utilization of these lands. These lands consist primarily of administrative sites outside the national forests and national grasslands such as ranger stations and horse pastures, and land utilization (LU) lands. Approximately 10,176 acres in administrative sites and 332,350 acres of LU lands were reviewed in 1970.

In 1970, the Forest Service prepared material for reports and hearings in connection with the

proposed establishment of the Oregon Dunes National Recreation Area, the Sawtooth National Recreation Area, the Bridger National Recreation Area, the extension of the Toiyabe National Forest boundary near Lake Tahoe, claims of the Pueblo de Taos Indians, Voyageurs National Park, and other pending legislation affecting transfers, sales and grants of National Forest System lands. Work continued in 1971 on the Oregon Dunes and Sawtooth National Recreation Areas. In addition, material was prepared for reports on the Seward and Hells Canyon National Recreation Areas, on the Alaska Native claims settlement proposal, and on adjustments to boundaries of the National Forests in New Mexico.

A study of the Cedar Creek land utilization area in Missouri was completed in 1970 and updated in 1971.

Lake Tahoe Agency

The President appointed a Forest Service employee as Federal representative to the Tahoe Regional Planning Agency as provided by Public Law 91–148. A fulltime planning team for the Lake Tahoe Basin was established by the Forest Service, which has been providing land management data and coordinating alternatives for management of national forest lands with the plans prepared by the Tahoe Regional Planning Agency for the Basin.

Optimum ownership patterns

Studies are conducted at field levels to determine what the optimum landownership patterns are, recognizing changing conditions and needs of society. Many management benefits accrue from having Forest Service ownerships consolidated in contiguous blocks; protection is simplified, land acquisition is more orderly, and resource programs are administered more economically and efficiently. Such studies provide a basis for guiding land purchase and land exchange programs. The National Forest Reservation Committee reviews and approves such studies before purchase and exchange can be made.

The following actions resulted: In 1970, extensions and retractions of the Wayne National Forest boundary in Ohio and the Hoosier National Forest boundary in Indiana, resulting in net eliminations of 682,000 acres; in 1971, almost 13,000 acres were added to the Toiyabe National Forest at Lake Tahoe, Calif.

In Oregon in 1970 an extensive study of the Klamath Indian Forest provided the basis for recommendations that any part of 135,000 acres not retained by the Indians be acquired by the public to assure a continued flow of products and services from the area.

In California, on the Eldorado National Forest, approximately 1,200 acres acquired by the Federal Government in partial settlement of trespass damages were studied and recommended for transfer to the Forest Service for administration as part of the national forest.

In 1970, over 26,000 acres were added through transfers from other Federal agencies: from the Corps of Engineers, some 1,500 acres at Monroe Reservoir and Cannelton Locks in Indiana, while 800 acres of national forest were transferred to the Corps of Engineers to facilitate management of the water control structures. In 1971, 1,093 acres were transferred to the National Park Service for administration as part of the Blue Ridge Parkway, and 1,212 acres to the city of Bristol, Tenn., for park purposes.

Through special studies, such as the Eldorado land acquisition and the Klamath Indian Forest acquisition proposals, management can examine how proposals could contribute toward developing a pattern of landownership that will best meet the needs of the Nation in future years.

- **Encourage the combination of small private forest landownerships into economically viable units for resource management and production.**

Forest landowners associations seek optimum land management patterns involving multiple ownerships. Among the approaches to improving forest management services to groups of private landowners are the Timber Development Organization (TDO) studies in Appalachia. Four such studies were made. One in Kentucky did not prove feasible.

In New York, a TDO operating under the name of Appalachia Forests Association, Inc., is providing forest products marketing and sales administration services to private woodland owners through a timber agent. The TDO was organized in March 1970 and a timber agent employed in April. By June 30, 1971, he had served 56 landowners and had sold 1.5 million board feet of timber on 626 acres for total stumpage receipts of $41,000.

In Tennessee, the Appalachia Forest Improvement Association has been in operation for 2½ years. This TDO is an association of forest landowners with 65 active members. The total area under management and marketing agreements amounts to about 18,000 acres. Management plans have been prepared for nearly all of the lands under contract. Ten timber sales have been prepared and four have been sold. Poor markets continue to hamper the opportunities to make sales since inception of the TDO. Some improvement in marketing conditions have been apparent, and it is expected that an improved sales program will occur. A stand improvement crew working under the direction of the association has been organized and is in operation.

Local efforts are underway to organize a TDO in North Carolina. It will be directed toward forest management in the Appalachia foothills.

Additional efforts in improving services to landowners include the Texas Aggregate, Lake State Forestry Cooperative, Forest Management and Sales, Inc., in Washington and Basin Woodlands Cooperative in Colorado. Each of these organizations is essentially a collective effort by small private forest landowners to improve the condition of their forest properties and to assure full value for the quality of products sold. Experience will be used during the seventies to direct similar approaches that may better serve the nonindustrial private landowner.

Improve the Welfare of Underprivileged Members of Society

- **Use forestry activities to help minority, economically depressed, elderly, handicapped, and youth groups.**

The Forest Service cooperates with various Federal departments and agencies, States and local community action agencies, private industry, and other groups to develop and administer programs that assist people who are socially and economically disadvantaged. Conservation and conservation-related work projects on National Forest System lands provide employment and training opportunities for special skills.

Job Corps conservation centers

Twenty Job Corps conservation centers were in operation during 1970, as authorized under title I, part A of the Economic Opportunity Act of 1964, as amended. A new program of patterning educational and vocational training to meet the needs of the individual enrolled was developed and instituted. This program materially enhanced the training offered to enrollees.

Trade union participation increased so that each of the 20 centers now has a union-sponsored vocational training program. Nineteen centers have programs with the International Brotherhood of Painters & Allied Trades, 15 with the Brotherhood of Carpenters & Joiners of America, and two with the International Union of Operating Engineers. Expansion has provided approximately 1,000 specialized union-sponsored training opportunities.

During 1970, over 7,000 underprivileged members of society were provided education, vocational training, and social living skills, and had the opportunity to improve themselves through the CCC program. At the same time, public understanding of conservation was enhanced as these young men trained in the environmental-education atmosphere of the centers.

The value of completed skills training projects exceeded 3.9 million dollars for fiscal year 1970. Over 70 percent of this accomplishment included environmental conservation and related work on National Forest System lands.

The Job Corps civilian conservation centers will continue at approximately the same level as 1970 but with increased participation in union-sponsored vocational training programs.

Manpower training programs

During 1970 the Forest Service participated in a number of other cooperative manpower training programs. These programs included Operation Mainstream, Neighborhood Youth Corps, Green Thumb, college work study, work incentive program, supplemental training and employment program (STEP) and others. During 1970, the Forest Service in cooperation with other agencies having

the primary responsibility for conduct of the programs hosted about 11,000 individuals enrolled in nonresidential training programs for primarily rural disadvantaged people. Trainees acquire skills through training projects designed by the Forest Service. While performing this work-training activity, the trainee is assisting in accomplishing much-needed conservation work on public lands.

In 1971, there was an increase in participation in the established cooperative manpower training programs with about 50 percent more enrolled in Neighborhood Youth Corps and 18 percent more in college work-study. Approximately 3,000 more youth were hosted by the Forest Service than in 1970.

Youth Conservation Corps

The U.S. Departments of Agriculture and Interior launched a 3-year pilot program in the summer of 1971, as authorized by Congress August 13, 1970. The Youth Conservation Corps was designed to provide—

1. Gainful employment of America's youth, ages 15 through 19, during the summer months in a healthful outdoor atmosphere;
2. An opportunity for understanding and appreciation of the Nation's natural environment and heritage;
3. Further development and maintenance of the natural resources of the United States by the youth.

For the Department of Agriculture, the Forest Service operated 34 residential and nonresidential camps employing 1,384 youths. For both departments, a total of 2,676 youths were employed (977 females and 1,699 males) on 64 projects in 37 States, the District of Columbia, and American Samoa. Only 4 percent of the youth failed to complete the summer program, with one-half of the camps having perfect completion records. Value of work done by the young people at Forest Service projects was $894,000.

The work included construction of 250 camping units at campgrounds, maintenance of 403 miles of trails, construction of 50 miles of trails, timber stand improvement on 2,055 acres, and wildlife habitat improvement on 1,031 acres.

The program drew almost unanimous praise and work was started immediately to organize the second year of the 3-year pilot project in the summer of 1972. The plan is that the total program will employ about 3,000 young men and women—from all economic, ethnic, and social backgrounds. The number of camps will be increased to 44 in national forests.

Civil rights

As of December 31, 1971, training in civil rights had been given to 4,100 work supervisors with the primary objective of increasing their awareness of potential problems. Training in civil rights is a year around program for supervisors throughout the country. The Forest Service civil rights coordinator has visited each region, station, and area to assist field personnel in upgrading their civil rights program. Procedures and techniques were developed and implemented for notifying minorities of Forest Service program benefits.

All public schools that share in Forest Service 25 percent revenue-sharing programs have complied with the Civil Rights Act of 1964. School districts that were not in full compliance in 1970 become eligible for the 25 percent revenue-sharing program in 1971.

● Encourage the States, other public bodies, private landowners, and industries to give special consideration and assistance to disadvantaged people in forestry programs.

● Training and employment opportunities for up to 80 potential gum production workers resulted from cooperative Federal, State, and industry efforts in south Georgia and north Florida, heart of the gum naval stores industry. Classroom and field study programs are open to economically and educationally deprived persons in this area who are physically able to work on gum farms. The naval stores industry badly needs these workers who will be trained in all facets of gum production and collection and related forestry projects.

● Information on low-cost wooden housing designs has been directed at chambers of commerce, real estate development agencies, League of Women Voters, and local authorities charged with land use, zoning, or financing for home construction, particularly in ten Northeastern States.

● In Alabama, Forest Service personnel have participated with Tuskegee Institute in the development of a forest and human resource development institute project to serve the forest-related work training needs and to assist black belt people. The project is cooperative, sponsored by Tuskegee

Institute, Forest Service, U.S. Department of Labor, and U.S. Department of Health, Education, and Welfare.

● The Appalachian community impact project is a 3-year program designed to determine how effective trained sub-professional leaders can be in stimulating and guiding small low-income communities in community development. During the past 18 months, achievements have ranged from cleanup campaigns, garbage pickup service, and installing community dumps to adult education classes, and several other community improvement projects. Current interest in and community responses to these programs suggest that future goals which parallel and extend the work will have "multiplier" enhancement affects.

● The Yazoo-Little Tallahatchie project featured the use and training of enrollees in the Operation Mainstream and Neighborhood Youth Corps programs. The rehabilitation project serves a large agrarian population displaced by a shift from hand labor to capital in intensive agriculture with associated use of new technologies. These displaced people like and want outdoor work, and are not adjusted to assembly line production techniques. Restoration of the land has provided seasonal jobs, thus enabling people to continue part-time subsistence farming. The area, the region, and the Nation's environmental and economic programs have benefitted.

● The naval stores conservation program contributed to the employment of more than 3,000 rural laborers, many of whom are uneducated, unskilled, and otherwise unemployable.

● State forestry organizations are employing thousands of people in their wildfire protection programs. These persons are mainly from low-income families in rural areas where opportunities for other jobs are often limited. States are also participating in the Neighborhood Youth Corps program. In fiscal year 1970 they provided 792,000 man-hours of employment and had 2,850 youth on their employment rolls.

Range management

Some 18,000 farming and ranching operations depend on National Forest System ranges to varying degrees. All are family-type operations—most of them small—and they provide the basic economic framework for many small rural communities throughout the country. These operations grossed about $170 million from the sale of livestock products in 1971. This generated an estimated $300 million of household income in rural communities.

Of the 18,000 ranching families, some 1,100 belong to ethnic minorities (Mexican American, Indian and black). During 1971, special funding for range development work was directed at areas where these minorities reside. A study in seven rural counties in northern New Mexico designed to develop methods for measuring and demonstrating the effects of alternative Forest Service programs on the economy of these rural communities was completed in 1971. Findings will be used in development programs for the area. The study is being conducted in cooperation with the Economic Research Service of USDA and is corollary to the broader Rio Grande Basin study being conducted by Economic Research Service.

The traditional and predominant vocation of Spanish-descended residents of northern New Mexico is livestock raising, which emphasizes the importance of the range management program to the area.

The methods developed will be used for similar studies in areas in Southeastern United States where rural black residents need income-producing opportunities. The results of these studies will help administrators select from alternative programs those that will most benefit disadvantaged minorities.

● Promote forest recreation opportunities of the kind and location that meet the special needs of the physically or economically underprivileged.

Special facilities on National Forests

In line with the President's program of providing more recreational facilities for the disadvantaged, several sites were specially designed and developed so that the handicapped can participate in National Forest outdoor recreational activities with minimum assistance. Every effort was made to eliminate both physical and psychological barriers to provide an enjoyable outdoor recreation experience. Facilities at the various areas include especially constructed nature trails with safety guide rails and yellow raised stripes to accommodate those in wheelchairs or on crutches, as well as the blind, the partially blind, the elderly,

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mentally retarded, and other handicapped persons. In addition, there are specially prepared camp units, picnic units, signs in braille, push-button recorders to interpret the flora and fauna, physical and cultural history, sanitation facilities and even fishing piers and a swimming pool.

Twelve such sites have been completed on national forest lands. They range from the Trout Pond Recreation Area for the Handicapped in the Florida National Forests to the Shady Rest campground, fishing pier, and nature trail near the Mammoth Visitor Center on the Inyo National Forest in California. Similar facilities are now in the planning stages for next year such as the picnic area and nature trail near Fall Creek in the Willamette National Forest in Oregon.

In 1970 and 1971, six more interpretive trails for the handicapped were built on national forests, which lead the Nation in the number of interpretive trails for the visually and physically handicapped.

Outdoor patterns for people, a pilot interpretive and environmental education program on the George Washington National Forest, Va., continued to serve special groups from the visually handicapped to the mentally retarded.

- Procurement actions have been taken to cooperate in Small Business Administration programs to contract specifically with minority groups in sign making and tree planting, and in contracting for campground maintenance and other local projects in rural areas.

Encourage the Development of Forestry Throughout the World

- **Work through international programs to acquire and exchange forestry knowledge and ideas.**

About 29 percent of the earth's surface is forested; 52 billion acres in the developing part of the world and 45 billion acres in the developed part. Much of the forest area in the developing countries is unexploited and represents a great reserve of wealth. Proper development of the forest resources could result in sizable industry, provide many jobs in rural and urban communities, offer possibilities for foreign trade and the earning of foreign exchange, contribute significantly to strengthening the economies of forest-rich countries, and provide forest products, particularly fine hardwood, that are needed in the United States. An essential element in such development is that the forest resources be placed under sound management for sustained production. As one of the leading technical forestry agencies in the world, the Forest Service is in a favorable position to contribute to such forestry development. The following are principal activities during 1970 and 1971:

Food and Agricultural Organization (FAO) of the United Nations:

Cooperation with FAO in support of international forestry continues to be manifested by participation in FAO's statutory bodies and international meetings, and by exchange of technical information, training of FAO fellows, and recruitment of Forest Service personnel for assignments with FAO.

- The second session of the committee of Alternates of FAO's North American Forestry Commission (NAFC) was hosted by the Forest Service in Washington, D.C., October 21–22, 1970. Representatives of FAO and the Governments of Mexico and Canada attended. Working groups reported on forest insects and diseases, forest fire control, forest tree improvement, wildlife and outdoor recreation, and forest engineering. Recommendations concerning the status of FAO statutory bodies and FAO's program of work and budget were made to NAFC and FAO. The Forest Service participated in plans for the sixth session of the commission (NAFC) itself, held in Washington, D.C., March 27–31, 1972.
- The Chief represented the United States at the 11th session of FAO's Latin American Forestry Commission in Ecuador. Forest Service specialists participated in a number of important international meetings including: FAO's regional consultation on forest industrial development in Latin America held in Mexico; the FAO/U.S.S.R. seminar on forest influences in U.S.S.R.; an FAO study tour of forest genetics and tree breeding in Hungary; FAO's third session of the Committee on wood based panel products in Rome, Italy; the

FAO/ECE (Economic Commission for Europe) symposium on forest operations in mountainous regions, Krasnodar, U.S.S.R.; the FAO/Latin-American seminar on watershed management, La Plata, Argentina) the world consultation on the use of wood in housing, Vancouver, Canada; and in the world consultation on forestry education and training, Stockholm, Sweden.

These meetings offered the United States opportunities to encourage application of modern technology and promote national development of forests, forest industries, and forestry institutions in the developing countries. The Forest Service will participate in two important 1972 meetings: The U.N. Conference on Human Environment, Stockholm, Sweden, June 5–16, 1972, and the Seventh World Forestry Congress, Buenos Aires, Argentina, October 4–18, 1972.

The Forest Service was designated by the Secretary of State to the Director-General of FAO to be the U.S. representative on the International Poplar Commission. This is a Commission that operates under the umbrella of the Forestry Department of FAO for the purpose of studying the scientific, technical, social, and economic aspects of poplar and willow cultivation and exchanging ideas and plant material between scientists, producers and users. A meeting of the Commission in Hungary was officially attended by Forest Service scientists in October 1971.

The reorganization of FAO's Forestry and Forest Industries Division into a Forestry Department with a Forest Resources Division and a Forest Industries and Trade Division was accomplished in 1970. Consolidating administration of its extensive field program within a Field Operations Service and sharpening of immediate and medium-term priorities for its regular program of work at headquarters were important outgrowths of U.S. recommendations and support.

- The Chief served as Chairman of FAO's Ad Hoc Committee on Forestry which met in Rome, Italy, February 1–6, 1971, to review the program of work of FAO's Forestry Department. The report of this Committee was then presented by the Chief to FAO's Council at its 56th session in Rome, June 9, 1971. Subsequently, the FAO Conference, in its 16th session, approved the establishment of the Committee on Forestry, as a permanent committee of the FAO Council, to review and advise on the medium- and long-term program of the Forestry Department. This new Committee on Forestry planned its first meeting in Rome, May 8–13, 1972, with anticipated Forest Service representation in the U.S. delegation.

- **Participate in and provide leadership to international groups and organizations fostering forestry.**

International Union of Forestry Research Organizations (IUFRO)

The Forest Service is a member of IUFRO, a nongovernmental group which is a Union of international forestry research organizations. IUFRO promotes, collaborates, and participates in forestry research the world over. Throughout 1970, preparations were made for the XV Congress of IUFRO which was held at the University of Florida during March 14–20, 1971; the Forest Service provided the Secretary-General and the Chairman of the Program Committee. A retired Forest Service research administrator completed 5 years as President of IUFRO at the end of 1971. The Union convenes a Congress every 5 years in the home country of the President of the Union to exchange information on research results and research techniques. Along with FAO and the Government of Canada, IUFRO cosponsored a world consultation on the use of wood in housing in July 1971, in which the Forest Service assumed a leadership role. In addition, the Forest Service participated in a meeting in Italy of the permanent and enlarged committee which governs the Union.

International Union for the Conservation of Nature and Natural Resources

In line with its strong interests and responsibilities in renewable natural resources and in the environment, the Forest Service became a member of the International Union for the Conservation of Nature and Natural Resources (IUCN). Active participation will begin with the XI General Assembly of IUCN scheduled for Baniff, Alberta, Canada, in 1972.

United States-Japan Joint Panel on Forestry and Panel on National Parks and Equivalent Reserves

The second meeting of the Panel on Forestry of the United States-Japan Cooperative Program on Natural Resources (UJNR) was hosted by the United States during August 31 to September 11, 1970. Four Japanese panel members, accompanied

by representatives of the Forest Service, USDA, and Bureau of Land Management, USDI, spent 4 days in technical discussions and 8 days in field travel in the Western United States to study soil and water conservation problems, programs, and policies. Particular attention was given to the protection, development, and management of mountain watersheds and to research in forest and grassland hydrology, snow management, water spreading, and vegetative manipulation on watersheds to improve water yields. The third meeting of the Panel is scheduled for May 1972 in Japan on the subject of "Forests and the Environment."

One member of the Forest Service participated along with other representatives from the Department of the Interior in a meeting of the Joint Panel on National Parks and Equivalent Reserves in Japan in October 1971. Ideas were exchanged on management of national park areas, their concept, organization, and structure and how they can best meet the needs of the people in each country. Discussions were held on national marine parks, national vacation villages, and the problems of nature protection in urban environments.

XI Grassland Congress

Forest Service experts in range management attended the XI International Grasslands Congress in Australia in 1970. This Congress is a significant area of activity because nearly half the land area of the world is used for grazing by livestock or wildlife. The Congress dealt with both cultured and natural grazing resources through presentations of scientific papers and discussions.

Public Law 480 research program

As of December 31, 1971, 55 forestry research projects, worth more than $4 million, but funded by soft currencies derived from the sale of surplus agricultural commodities, were in operation in seven countries. During calendar year 1970 and 1971, 14 Forest Service scientists made on-site inspection of research underway and conferred with their foreign research colleagues about research problems, publications, and potentials of mutual concern to the countries involved. Grants of these and 125 completed projects in a wide range of forestry and related subjects were authorized under the Agriculture Trade Development and Assistance Act of 1954 (Public Law 480, amended). Since 1958 the U.S. Department of Agriculture has approved 1,298 grants for agricultural and forestry research in 32 countries involving over 500 foreign scientists. In addition to the important technological contribution made under the Public Law 480 research program since 1958, it has stimulated establishment of research institutions and high quality scientific investigation in many of the developing countries.

Some examples of the useful information resulting from this foreign research program are the following:

- Surveys of forest tree diseases in India and Pakistan have produced valuable information on the occurrence and distribution of nearly 150 pathogens. Many of those identified are important in the regions surveyed and a number are potentially serious pathogens on North American tree species. These projects have provided indispensable information on severity of these diseases and necessary information in regulating international movement of plant materials from these regions.

- Several American conifer species were tested for their susceptibility to the very destructive pine twist rust in Italy. Test results showed that 15 American tree species, including Douglas-fir, larch, and several species of pine, were susceptible to the virulent rust pathogen. U.S. pathologists and foresters now are aware of the extreme danger of spread of this disease, and plant materials from regions where this rust pathogen are indigenous are being carefully scrutinized by regulatory agencies.

- Long-term studies, partially supported by Public Law 480 funds, have identified specific factors or agents causing mortality of gypsy moth under a wide range of environmental conditions in Yugoslavia. These include bacterial pathogens, viruses, parasites, and predators. This information will be utilized in developing integrated control methods for managing the gypsy moth. This program ties in closely with the current USDA gypsy moth research and development program.

- A Spanish-English forestry terminology book, published as a result of a Public Law 480 project in Spain, will contribute to international cooperation in forestry education and practice. The book contains an alphabetical list of 7,000 English forestry terms, followed by the Spanish equivalent and vice versa. This publication has

been distributed widely to libraries and scientists in the United States. It has been found to be extremely helpful, especially to U.S. foresters who deal with Spanish or Latin American subject matter.

Translation services

During fiscal year 1970 and 1971 English translations of 4,287 pages of foreign scientific publications and documents of primary interest to forestry were made available to Forest Service scientists and technicians. Most (3,671 pages) of these translations were processed under the Public Law 480 special foreign currency science information program, 421 pages by the Department of Commerce Joint Publications Research Service, and 195 pages by the Department of State's Language Service Division and private contractors. In addition, 212 foreign letters were translated by volunteer Forest Service employees.

World forestry resources

The special program of preparing reports on forest resources and forest industries of selected countries was terminated June 30, 1970. However, because of many inquiries and a demand for technical forestry information the Division of International Forestry has continued to study and report on forestry situations in other countries. A summary pamphlet on Argentina forestry is being prepared in anticipation of a demand for information prior to the VII World Forestry Congress in Buenos Aires in 1972. A fact sheet on Indonesia is also in process.

Training foreign nationals

The Forest Service provided for the training needs and technical assistance of 591 visitors from 49 countries during the years 1970 and 1971. Two hundred and twenty-eight new training programs and study tours were prepared. Seventeen of these were amendments to programs.

Sixty-six programs were prepared for visitors sponsored by the Agency for International Development (AID) and 55 for visitors sponsored by FAO. The remaining 100 programs were for visitors who were self-sponsored or sponsored by their employers, governments, international foundations, or by the U.S. Department of State through its educational and cultural exchange programs.

Interests and training objectives covered all important aspects of forestry. Overall, international visitors spent a total of 2,776 man-days with the Forest Service and received 2,884 man-days of assistance from field personnel.

- **Provide highly competent personnel to help developing Nations establish sound forestry programs, and consider such assignments as part of career development.**

During 1970–71, 28 Forest Service personnel served AID, FAO, and other United Nations agencies in 17 countries, on assignments of 1 year or longer. Short-term assignments of less than a year involved 12 Forest Service experts providing technical assistance in forest and range management in 12 countries.

At the request of Indonesia, the Chief visited that country for 1 week to consult with its Forest Service on possible assistance to improve administration of its timber concessions. His recommendations led to the assignment in Indonesia in 1971 of two specialists in forest organization and administration, and in requirements and standards for timber concessions. This study was followed by a visit from the Associate Deputy Chief for Research to discuss and evaluate the Indonesian forestry research program.

During 1970–71, four Forest Service specialists continued their assignments under Participating Agency Service Agreements (PASA) with AID in Vietnam (1), Kenya (2), and in Laos (1). The Laos PASA terminated in mid-1971, mainly due to AID reduction in force and increased security problems. The Associate Deputy Chief spent a week in Vietnam in October 1971. As a result of his visit the Forest Service anticipates increased activity in this PASA based on the need for development of export of timber and timber products.

Through Forest Service correspondence the forest industries of many of the developed and developing countries were strengthened. For instance, assistance was given to an Ecuador furniture plant, an Indonesia sawmill, and a Mexican industrial complex concerned with logging, milling, turning, and finishing of miscellaneous products for export. The Forest Service is cooperating in

a program of Organization European Community Development (OECD) to standardize the testing and certification of forest tree seeds. Over 700 inquiries and requests were received from foresters, scientists, and forest industries at home and abroad during 1970–1971. In addition to technical assistance, requests were received for publications, handbooks, and other technical printed materials, and for information on forestry employment and training opportunities, exchanges between scientists, and involvement of universities and other forestry institutions in international forestry development. Many requests concerned seed exchange programs.

Involve the Public in Forestry Policy and Program Formulation

- **Seek out and obtain local and national views in the process of policy and program formulation.**

The Forest Service has responded to the public desire to be involved by greatly expanding its efforts to inform and involve the public in policy and program formulation. As an aid to assist field personnel in improving and expanding the public involvement process the Chief of the Forest Service issued in January of 1971, "A Guide to Public Involvement in Decisionmaking."

In a memo which accompanied the "Guide," the Chief stated:

"For 60 years the Forest Service has worked to get the American public more interested in and concerned about conservation of our Nation's natural resources. During much of this time the attitude of large segments of the general public had been that conservation was 'nice,' but not something to be greatly concerned about.

"Today this attitude has completely changed. The surge of public interest in the quality of the environment in the past few years has made conservation a national issue—one in which a great many people are now deeply concerned and want to become involved. We should be extremely pleased with this change in public attitude for it provides us with a wide range of new opportunities.

"This new public concern provides us the opportunity to more fully inform an attentive public of the principles of conservation which have long been the basis of Forest Service management. And there is no doubt that increased public interest and involvement will also provide us with the opportunity to reach better land management decisions, both in terms of protecting or enhancing the quality of the environment, and in terms of meeting public needs for goods and services. As proponents of the twin principles of sustained-yield and multiple use management, it provides us with a unique opportunity to gain greater public recognition and understanding of these principles and the need for a balanced program in all aspects of forestry and forest land management.

"The Forest Service is committed to seeking greater public involvement in its decisionmaking process; indeed, we welcome it. Our statements of objectives and policy guides as embodied in 'Framework for the Future,' issued in February 1970, identified increased public involvement as one of the eleven major objectives of the Forest Service. One of the policy guides listed as in support of this objective is—'seek out and obtain local and national views in the process of policy and program formulation. * * *' This we shall do."

- **Discharge our responsibilities in ways that make our management processes visible and our responsible people accessible.**

In May of 1971, additional emphasis was placed on identifying procedures and responsibilities in the area of public involvement with the issuance of a draft program titled "Inform and Involve." Field offices began immediately to apply the concept of the program as refinement continued. The revised inform and involve guides are to be issued in February of 1972.

The objective of the inform and involve effort is "* * * to inform the public of the scientific, social, environmental, and economic factors that relate to land and resource management, and to involve the public constructively in providing information, comment, and points of view that will

lead to better land and resource management decisions."

In an effort to keep the public informed on forest programs and activities, the inform and involve program seeks to:

I. Establish a procedure that will facilitate early identification of activities and issues that are of potential current interest at local, regional, and national levels for possible I&I action.

II. Broaden communication with TV, radio, and press contacts, and with media personalities, and provide them with increased opportunities for reporting on stories of potential interest to the public.

III. Seek out opportunities for Forest Service officials to speak out on current issues, correct erroneous information, and explain programs.

IV. Broaden contacts with groups, associations, and organizations to better inform and involve a wide range of the public on current programs, projects, and issues.

The Forest Service has had a long history of involving the public in its program formulation through advisory councils, show-me trips, correspondence, and direct personal contact with local people. This process helped keep the public informed on upcoming projects, and assured citizens the opportunity to comment and make suggestions that could be incorporated into program planning.

For many years, interest in being involved in forest program planning and development was primarily limited to local people who lived nearby forests, major forest user groups, and conservation associations. Today increasing public demands for all forest users, intense public interests in protection of the natural environment, and a tremendous increase in the number of people visiting the forests have made forest program planning and development of vital interest and concern to all Americans, in both urban and rural areas.

- **Consult with and seek cooperative action with agencies at all levels of government, and with private groups and individuals, in programs for resource management and economic development.**

In addition to broad efforts to inform and involve the general public, the inform and involve program calls for increased efforts at informing and cooperating with local, State, and Federal agencies, and with private groups and organizations. The inform and involve guidelines in this area seek to:

1. Provide State and local governments and regional planning units with advance information on developing management plans and on upcoming programs or projects in which they may be concerned.

2. Through the State foresters, provide private land owners with information on developing management plans and on upcoming programs or projects in which they may be concerned.

3. Establish procedures to obtain comments, suggestions, and alternative proposals on land management decisions from State and local governments, regional planning units, and private landowners.

4. Provide information to the general public through all appropriate media on progress and status of on-going cooperative planning efforts, cooperative programs, and cooperative projects.

5. Identify and develop contacts with groups, associations, and organizations that have an interest in outdoor land management. The five basic categories to work with are: environmentalists, resource dependent industries, recreationists, governmental agencies, and concerned citizens.

6. Concerned citizen groups, while having no direct special interest areas, are dedicated to the enhancement of their national heritage, and every effort should be provided to inform and involve them in outdoor land management. Examples of these groups are: women's groups, academic groups, civic organizations, young adults, professional societies, and Forest Service retirees.

7. Inform all groups on a continuing basis with press releases, background statements, and publications on all current interests and issues, and seek their comments.

8. Keep all interest groups fully informed of the needs and demands of others to encourage a more balanced understanding of forest land management.

The publication, "Guide to Public Involvement in Decisionmaking," sets forth a key consideration that serves as the basis for constructive public involvement.

"The key to this question is 'awareness', and the key to awareness is 'listening.' This means a lot more than listening to individuals and groups that come to you. It means keeping fully informed as to the attitudes, interests, and desires of local, regional, and national publics. It means seeking out and listening to individuals and groups which may have traditionally opposed certain aspects of Forest Service management. It means spending as much time and effort at listening as we do at informing. It means that every technique and medium that we use to inform and involve the public should have built into it a procedure for eliciting public response.

"* * * In addition to the need for public awareness, there is also need for awareness of the interests of Federal, State, and local agencies. Our projects and proposals often have considerable impact on the activities of such agencies. Circulation of draft project plans to Federal, State, and local agencies at an early stage will give us the benefit of their thinking and enable us to develop thorough and better coordinated proposals for public consideration."

Expand Public Understanding of Environmental Conservation

- **Promote efforts to provide information to the general public on the vital role of forestry and related environmental conservation.**

What interests people?

Improved communication between forest resource managers and recreation visitors can result in better environmental understanding and more meaningful outdoor experiences. One study among many interpretive studies being conducted at the Pacific Northwest Forest and Range Experiment Station was made to determine what subject matter, stimuli, and communication approaches were most effective in interpretive programs for holding visitor attention and transmitting information regarding forest environments. Results showed that:

(1) Animals interested visitors more than plants;
(2) Audio messages were remembered better than printed labels;
(3) Facts were remembered better than concepts;
(4) Specimens and models were remembered better than still pictures; and
(5) Children liked something they could manipulate.

In calendar year 1971, over 26 million visitors enjoyed visitor information services such as conducted walks and talks, as well as various interpretive facilities on National Forest lands. As of 1971, Visitor Information Service had developed the following total number of media and facilities throughout the National Forest System and selected research stations:

973 Interpretive signs
291 Slide talks
289 Information Stations (includes Ranger Stations where visitor services are provided)
256 Interpretive trails
255 Scenic overlooks
209 Interpretive brochures
60 Auto tours
24 Visitor Centers.

In 1970 five more interpretive trails for the handicapped were built on national forest lands, bringing the total to 12. Largely through the leadership the Forest Service has shown in this area, the interest in such trails is growing throughout the States and in private institutions, and schools for the handicapped.

At Lake Tahoe, on the Eldorado National Forest, Calif., the Stream Profile Chamber in 1970, its first full year of operation, afforded over 100,000 visitors a unique underwater view of Taylor Creek and its ecology. In September 1970, the Sylvania Visitor Center, the gateway to the superlative natural environment of the Sylvania Recreation Area, Ottawa National Forest, Mich., opened its doors to national forest visitors. Construction will soon be started on the Lava Lands Visitor Center, Deschutes National Forest in Oregon and on the Seneca Rocks Visitor Center, Monongahela National Forest in West Virginia.

In 1970, the Visitor Information Service prepared interpretive plans and designs for two re-

search facilities, the Delaware Laboratory and the Pinchot Institute for Environmental Research to help explain to visitors the research problems being explored there.

- **Cooperate with and encourage other Federal, State, and private organizations in the development of conservation education programs.**

Private Associations

- At the end of 1971, five interpretive associations were in operation through cooperative agreements at various visitor information service (VIS) facilities throughout the National Forests. These associations are composed of local citizens who provide visitors with additional information on natural and human history, forestry, and fire prevention at Visitor Information Service facilities. Also in 1971, negotiations were begun on an additional five association agreements.

- In cooperation with the State of Alaska, a unique interpretive program is being conducted aboard the ferries of the Alaska Marine Highway System. As the ferries ply the inland passage, Forest Service interpretive naturalists conduct guided shipboard interpretive walks, provide information, show films and slide programs, and give talks on the natural environment the visitor sees as he travels through Alaska, particularly the forest resources and activities along the shorelines.

- VIS is increasing its efforts to share its interpretive knowledge and expertise with the States. For example, through the State and private forestry programs, VIS held a 1-day seminar in 1970 with State foresters and their staffs from seven Eastern States. The purpose of the meeting was to explore ways in which VIS expertise in visitor services and the interpretive media and techniques used on Forest Service lands can be applied to visitor problems and needs on State forest lands.

- **Help develop methods to assist the Nation's educational system in teaching conservation principles.**

In many locations Forest Service personnel have worked to establish and are participating in environmental education advisory councils. These councils are a vehicle which can be used by organizations and community leaders to assist the schools to develop or improve environmental education programs.

An environmental education plan has been developed to increase the effectiveness of services to the educational system of the Nation. Specifically underway is a program of advanced training for field people who assist with teacher education, identification of appropriate forest sites to be used by teachers and children, and an up-dating of environmental education materials.

In the 2½ month period surrounding Earth Day on April 22, 1970, over 580 Forest Service personnel made presentations to students and conservation and civic groups at teach-ins, reaching over 100,000 people. In addition, some 50,000 slide talks, movies, and films were distributed to student and conservation groups. The demand for Forest Service materials and participation in teach-ins was encouraging and afforded an opportunity to explain conservation policies and environmental concerns.

Develop and Make Available a Firm Scientific Base for the Advancement of Forestry

- **Conduct research programs needed to insure the rapid and efficient advancement of programs aimed at obtaining optimum benefits from forest resource management, protection, and utilization.**

Forest Soils

Forest soils remain as the least known portion of the forest trees' environment. Research has been limited in part by the complexity of the problem and because the work is laborious and time-consuming. Researchers in Oregon have developed a simple method of assaying forest soil for inhibitory fungi, that is, fungi that produce antibiotics against specific disease-producing fungi. The root pathogen, *Poria weirii*, is being used as the test organism.

Blister rust

Search for a control for white pine blister rust continues in the laboratory. Pine tissue cultures

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derived from needles of *Pinus monticola* are being used as the test entity. These needle tissues can now be infected by the blister rust fungus as easily as tissues derived from pine stems. Use of needle tissues is more practical, since infection occurs almost entirely through the needle.

Significance of natural inactivation of lethal blister rust cankers by the fungus, *Tuberculina maxima*, is being studied. In 1965, 62 percent of the lethal white pine blister rust cankers sampled were inactive. *T. maxima* was found fruiting on 24 percent of the active cankers and could possibly be increased in effectiveness through forest management techniques.

Fusiform Rust

Investigations are in progress to determine if pathogenic variability exists in the destructive fusiform rust, *Cronartium fusiforme*. Results of initial studies do not indicate pathogenic races, but do show differences in levels of pathogenicity. This fact has important implications in breeding rust-resistant pines. A pine resistant to one race of the rust may be killed by another more virulent race.

The difficulty of observing the transparent germ tubes of *Scleroderris lagerbergii* spores precluded study of the infection process. A method has been developed for labeling the spores with a fluorescent brightener without inhibiting germination. By using this technique, penetration of host tissue by the fungus can be studied more easily.

Virus Diseases

Scion material obtained from trees infected with elm phloem necrosis and from trees infected with walnut bunch disease was successfully patch-grafted to American elm and black walnut, respectively, in nursery-grown trees. Preliminary electron microscope examinations of elm root and stem phloem tissues revealed the presence of mycoplasma-like bodies in phloem necrosis-infected scion material. Thus, two of the most common and serious "virus" diseases of trees may not be caused by viruses.

Saratoga Spittlebug

Sweet-fern is one of many low-growing plants or trees which serve as alternate hosts for the Saratoga spittlebug nymph, a serious pest of red pine plantations in the Lake States. Its abundance is directly correlated with degree of injury by the spittlebug. Elimination of sweet-fern by utilizing the moth, *Acrobasis comptoniella*, and other specific agents which feed on sweet-fern could reduce spittlebug damage. By determining the percentage of ground cover occupied by sweet-fern and other suitable hosts as a group, it is possible to predict the potential severity of injury by the spittlebug.

Use of parasites

Quantitatively oriented ecological studies have shown the relative importance of the interacting factors affecting forest stands. Life table data for forest stands or insect populations are essential. They reveal the age intervals in which insects are most important in determining yield and value. These data can be used to devise management plans to optimize forest outputs and to minimize losses due to pests.

Massive releases of parasites can help regulate pest populations. An Oregon area was inundated with the parasite, *Itoplectis quadricinqulatus*, with a resultant 30-percent reduction in pupae of the European pine shoot moth. This reduction in the host population compared favorably with that expected for a release of similar numbers of sterile male moths.

Approximately 25 percent of the adults of the southern pine beetle, black turpentine beetle, and the three *Ips* engraver beetles collected in the Southeastern States were infested with parasitic nematodes. Nematodes in two of the genera collected are known to reduce egg production by at least 50 percent. Such findings help explain factors causing fluctuations of populations in the natural environment.

Western budworm

The effects of reduced dosage rates of Lannate were studies on late-stage larvae of the western budworm. Physiological responses to the insecticide led to a 28 percent reduction in body weight. In addition, pupae developing from treated larvae weighted less, and adults were less fertile. This suggests that there may be some merit in applying pesticides at sublethal rates in the interest of minimizing environmental contamination.

Sap pressure

A study of trees under stress has shown that accurate assessment of the xylem sap pressure is the single most important measurement for evaluating water status in trees. Water status and the relative transpiration rate are important in understanding

variations in leaf temperature, energy exchange, and tree vigor. All of these, in turn, are closely related to detection by airborne sensors in surveys for beetle-infested trees.

Snowpack Melts

Water moving downslope below the soil surface, not over the soil surface, is the major source of high streamflows originating from wetted, unfrozen forest soils of the Allegheny-Cumberland Plateau Region. Small plot and watershed studies showed greatest storm discharge from fine-textured soils and lesser amounts from coarse-textured soils. Concentrated subsurface stormflow occurred primarily from water passing through large openings in the soil profile made by burrowing animals and decayed roots.

A simple, inexpensive, accurate, snowmelt lysimeter-type gauge has been developed in northern Idaho to provide continuous readings of water volume flowing from the base of a snowpack. Measured water comes from snowmelt or a combination of melt and percolated rain. Data obtained are applicable in river flood forecasting and in snow hydrology studies.

Water Deficiency

Tree species that are more economical water users close their stomates quickly in response to stress caused by water deficiencies. Transpiration-decline curves obtained with excised twigs from 3-year-old seedlings at Wenatchee, Wash., indicated that stomatal closure occurs more rapidly in pines and spruce than in firs. In grand fir and Douglas-fir, a drought-caused decline in transpiration rate was associated with a relatively small reduction in size of stomatal aperture as compared with pines and spruce. The stomata of the pines and spruce are relatively sensitive to leaf moisture, whereas those of Douglas-fir and particularly grand fir are less sensitive.

Mule Deer Feed

Grasses and forbs are the major diet of the mule deer in Colorado's big sagebrush type. Shrubs dominate the winter diet of deer only when forbs and grasses are covered by snow. This condition is probably the critical forage period, but terminal starvation occurs later even though forage abundance and quality are improving.

Miscellaneous findings

- Gardner saltbush and Nuttall saltbush reproduce vegetatively as well as by seed. Gardner reproduces mostly by root-sprouting, whereas Nuttall saltbush spreads mostly by layering. Both species appear to be fire-resistant plants with desirable browse characteristics.
- Color infrared space photographs of the earth, similar to those obtained by the Apollo 9 mission, provide the instantaneous synoptic base for classifying and prestratifying groups of closely related plant communities. However, as more detailed quantitative information is required, support aerial photographs at various scales are needed to provide sampling bases.
- Research to develop marking guides for hardwoods based on expected rates of values increase has provided guidelines for foresters to aid in selective cutting of northern and central hardwoods. Financial maturity information has been developed for major species of hardwoods from recently collected tree growth and tree quality data. Increases in tree value are projected for 10 years to determine rates of value increase for different tree classes.
- Analysis of the southern forest economy by input-output procedures showed that primary processing industries produced $5.1 billion worth of output annually. Secondary processing industries converted a portion of this output to $3.4 billion of products. Collectively, forest-related industries paid $2.2 billion in annual wages. Results of this study help evaluate the economic impact of forestry investments and related development of forest industries.

Narrow logging roads. Logging road systems on steep slopes in northern Idaho take a portion of the area out of timber production. However, measurements in well-stocked plantations of western white pine show that trees adjacent to the roads grow faster and can offset the loss in area used for roads that do not exceed about 14 feet in width. On stable soils with good drainage characteristics, a well-drained system of narrow roads can produce multiple benefits with little or no loss in timber production.

Better growth and yield data. The ability to estimate present and future stand volumes is essential in scientific forest management. Equations have been developed for long-term growth research

data for loblolly pine in Georgia that explain 77 to 93 percent of the variation in board feet and cubic foot yields, respectively, of managed stands of different density levels.

Forest culture affects permafrost. Successional trends in forest stands often produce, or reflect important physical and biological changes throughout the ecosystem. A study of forest succession along the Chena River in Alaska shows that deeper, more rapid soil freezing and thawing are associated with early successional stands of willow balsam poplar than with later successional stages. This information suggests that appropriate stand management may help retard development of permafrost and maintain site quality.

Shelterwood system. Shelterwood cutting are effective in regenerating sugar maple and yellow birch on well-drained northern hardwood sites and somewhat poorly drained hemlock-yellow birch sites in the lake States. The proportion of yellow birch reproduction can be increased over four times by scarification and understory control in hemlock-birch stands; these treatments are somewhat less effective on northern hardwood sites.

Introduced pines in Hawaii. Hawaii has no native conifers and must import more than 90 million board feet of softwoods per year. Experimental planting on Maui have shown that after 9 years, slash and loblolly pines have grown twice as fast as in the Southern United States. Monterey pine is growing at a rate similar to that in plantings in New Zealand, Australia, and South Africa, but Carribean pine has poor form. Based on these early results, a 30-year rotation is predicted, but wood quality and potentially injurious agencies must be evaluated before these species can be recommended.

Seed collection zones; southern pines. A comprehensive study was started in 1951 in the South to determine how far from its source seed of the four major southern pines could be planted without adverse effects on plantation performance. All species showed important differences in survival, growth rate, and other characteristics related to geographic seed origin; all were sensitive to being planted too far from the seed origin. Maps have been prepared showing seed collecting and planting zones within which each species can be moved safely.

Genetic gain; longleaf pine. Selection for improved trees may be accomplished by selecting parents on the basis of their own performance, or by the performance of their offspring, or by a combination of both. Studies of longleaf pine indicate that selecting the best 25 percent of the parents on their own performance produced seedlings 12 percent taller than average. Selection of the best 25 percent of the parents on performance of their offspring resulted in a 23 percent higher gain, or a total of 35 percent in one generation.

Yellow-poplar regeneration. Better information is needed on how season of logging influences the species composition of the new forest stand. In a West Virginia study, harvest cuts made in the fall or winter promoted early spring germination and rapid growth of desirable yellow-poplar, an intolerant species. Logging delayed until spring or early summer results in poplar seedlings germinating late in summer, when many are unable to compete successfully.

- Control of erosion is a critical consideration when steep unprotected slopes are exposed as in highway cuts and embankments. Past research has dealt primarily with flat or nearly flat agricultural land. New criteria for road location and construction standards have been developed.
- Present logging systems create environmental problems especially in the West. New systems featuring improved skylines, balloons, and helicopters are being evaluated in the laboratory and under field conditions.

- **Make research results rapidly and equally available to all through information, education, demonstration, and technical assistance.**

Wood frame construction

The most comprehensive and authoritative manual on general house building, Agriculture Handbook No. 73, Wood-Frame House Construction, has been revised to include up-to-date information on homebuilding materials, including assembly and arrangement of parts of a well-designed, wood-frame house.

Sound insulation values of various apartment wall constructions are available from acoustical laboratories, but applicability to actual construction was not proven. Research conducted to obtain field measurements of sound transmission in 11 apartment buildings confirmed that wood-frame party walls can achieve the potential sound insulation shown by laboratory tests.

Damage following hurricane Camille was surveyed to observe structures evidencing resistance to wind and wave action. Wood-frame buildings exhibited remarkable resistance to wind forces that totally destroyed nearby structures. Wind damage to some wood-frame houses was obviously due to poor nailing. Pole-type foundations would have provided further protection from flooding and wave action.

Other findings

● Research results indicate that a 10-minute treatment in saturated steam at 360° F. effectively reduces thickness swell and springback in exterior particleboard. The treatment has little adverse effect on strength properties, and results are not influenced by species, resin content, and particle shape. Stabilization greatly enhances feasibility of utilizing various forms of residue wood in particleboard for exterior applications.

● Two of the world's greatest collections of woody plant material were obtained by the Forest Service from Yale University and the Chicago Field Museum of Natural History. This quadruples the size of the Forest Service collection at the Forest Products Laboratory at Madison, Wis., and makes it by far the world's largest, best, and most useful single collection.

● Thousands of wood signs are used in recreational areas of Federal and State forests and parks. Research has shown that the best material for large signs, regardless of geographic location, is medium-density, paper-overlaid plywood. Guides for selection of sign materials and finishes, as well as procedures for routing and finishing, have been developed to improve performance and appearance over extended periods.

● A commercially practical method for removing bark from wood chips would allow recovery of 10 to 30 percent more wood fiber per acre, depending on species and type of harvest. Several methods (mechanical and liquid-medium processing) for removing bark from wood chips are under study. A process using steaming, compression, and abrading have been developed and successfully demonstrated in the laboratory.

● Bark, sawdust, chips, shavings, and lignin—while a potentially valuable resource—currently constitute a major disposal problem and contribute to environmental degradation. Four new comprehensive reviews have been issued to summarize current status of knowledge and practices in the utilization of these materials. Detailed descriptions of the resource, estimates of available quantities, methods of utilization, and lists of references are given.

● Furfural was produced experimentally from representative samples of waste sulfite pulping liquors and the economics involved appear favorable. These studies demonstrated both the feasibility of commercial production of furfural from sulfite liquors and a way to reduce the level of effluent pollutants.

● Foster relationships between research scientists and forest managers that facilitate joint implementation of research results.

Radiobiological investigation. In cooperation with the Atomic Energy Commission, the Forest Service has created a major research installation at Rhinelander, Wis., to study the effects of ionizing radiation on northern forest types. Ionizing radiation, both man made and natural, is an especially important environmental factor influencing longlived organisms such as forest trees. Up to 40 percent of the genetic changes occurring in forest species have been attributed to natural radiation—a most significant impact. With the increasing use of nuclear materials, information is needed about the effects of accidental irradiation of forests.

Scientists are also gathering highly useful, basic ecological information on typical northern forest ecosystems. Fencing, a border zone, and other safety precautions prevent accidental exposure of people and large animals.

Mycology Research Center

The Forest Products Laboratory acquired a new dimension in 1971 with the establishment of a center for forest mycology research. The center evolved from the Forest Service's Forest Disease Laboratory, which was transferred from Laurel, Md., complete with staff, facilities, and fungus cultures. The move brought closer together FPL's long-time research on fungi that cause wood in service to rot with the Laurel Laboratory's investigations of the life cycles and related information on fungi that exist in association with trees.

The center is one of three in the world where pure cultures of fungi are maintained and available for study; others are in Ottawa, Canada, and Baarn, the Netherlands.

- **Promote research in forestry through cooperative programs with educational institutions and other public and private organizations.**

● Research results on housing and construction are directly applicable to solutions of problems associated with national housing needs and efficient use of wood resources. By sponsoring and participating in housing conferences and exhibitions, and by contacts with builders and housing groups, the Forest Products Laboratory saw to it that these research results were demonstrated and made available to individuals, firms, and agencies concerned with local housing requirements. Low-cost house plans, sound construction practices, and recommendations for properly finishing and maintaining of wood homes were made available as part of a continuing cooperative Federal-State program.

● As the Nation seeks to meet its housing goals during the coming decade, similar conferences and contacts with builders and housing groups will help to meet this objective.

● During 1970, a total of 265 State forestry and industry personnel in 18 States received training in specialized forest products utilization subjects, and learned proven practices that increased efficiency in harvesting, processing, and marketing wood products and that use wood residues, thus reducing pollution. The goal of this continuing program is to render well-qualified technical assistance to the forest products industry by a force of more than 800 cooperatively financed State forestry personnel.

● Efficient lumber drying practices are demonstrated to capacity groups of dry kiln operators at a 2-week program conducted annually at the Forest Products Laboratory in Madison, Wis. Industry personnel are trained to use the research results to dry lumber more quickly at less cost, and with fewer volume and value losses caused by drying degrade. Forest Service and State forestry men also cooperate with university and extension personnel in planning and conducting regional short courses in lumber drying for industry. Annual kiln drying short courses will be offered during the coming years. They will incorporate the latest research findings into practical production programs.

● The Forest Service and State foresters cooperated in a program to get research results into the hands of industry users and to implement them. Information, education, demonstration, and technical assistance activities involved a force of 75 Federal and State forest products utilization specialists, assisted by more than 800 State service foresters.

Professional meetings

The impact of new cultural techniques such as fertilization and irrigation on wood quality was examined at a Forest Products Laboratory symposium jointly sponsored with a committee of the American Paper Institute and the Technical Association of the Pulp and Paper Industry in November 1971. Some 130 representatives of industry, forestry schools, and research laboratories heard speakers report on research dealing with the effects on wood of such techniques as short rotations and growth stimulation.

Every year, FPL specialists participate in programs of such organizations as the American Chemical Society, the Forest Products Research Society, the American Society for Testing and Materials, and Technical Association of the Pulp and Paper Industry, and the United Nations Food and Agriculture Organization.

Numerous technical and trade organizations send groups to the Laboratory to discuss application of research results and technological problems of their industries. Among these are representatives of the National Forest Products Association, the American Plywood Association, and committees of the American Paper Institute, the Technical Association of the Pulp and Paper Industry, the American Society for Testing and Materials, American Railway Engineering Association, American Wood-Preservers' Association, the National Woodwork Manufacturers Association, and the Pulp Chemicals Association.

Some 100 scientists and engineers attended a symposium on research to improve design of light-frame construction in February 1970, and in October of 1970 and 1971 Yale University's 35th and 36th industrial forestry seminars were held at FPL.

Public education

● Over the years, the Forest Products Laboratory has acquired many public use patents available for license from the Secretary of Agriculture.

● FPL's longtime research on wood identification and anatomy was reorganized as a Center for Wood Anatomy Research. The services of this Center are familiar to wood products producers

and buyers, importers, and government officials as well as crime investigators, archeologists, museum directors, sellers and buyers of antiques, woodworkers, artists, and the public generally—all of whom make use of its free wood identification facilities. The Center's leader spent 8 weeks in Bogor and Jogpakarta, Indonesia, teaching wood anatomy and identification at two universities.

SPECIAL REPORT ON FOREST PRODUCTS LABORATORY

Introduction

Wood, one of man's most useful and versatile raw materials, can be uniquely beneficient in its environmental and ecological impacts. It can be harvested with little lasting impact on ecological conditions; for every mature tree harvested, another can be grown, renewing the resource. Likewise, it can be processed into thousands of consumer goods with byproducts either themselves potentially usable or easily disposed of under environmentally harmonious conditions. And when a wood product's usefulness is ended, it can be recycled for another use or returned to the organic cycle from which man borrowed it.

The necessary technology for acomplishing this is an end product of basic and applied research. One of the primary missions of forest products research is to find those techniques, processes, and practices that will attain these wood utilization goals with as little environmental or ecological disturbance as humanly possible while maintaining a flow of needed products to a growing population.

This research review for 1970 and 1971 recounts a number of solid contributions toward fulfillment of that mission by the Forest Products Laboratory at Madison, Wis. For every research advance described, numerous others more or less closely related are in many stages of development.

BOF: More lumber per log

As experience with Operation Breakthrough (a program sponsored by the Department of Housing and Urban Development) proposals has once again clearly demonstrated, wood and its products—lumber, plywood, particleboard, fiberboard, etc.—are indispensable building materials without which national housing goals would be far more difficult of attainment. Any system of sawmilling that promises more lumber from a given number of logs, therefore, has great significance for every citizen.

BOF is such a system. The name is an acronym for "Best Opening Face." From the smaller, largely second-growth timber now increasingly coming to sawmills in all regions, it offers the potential of extracting up to 10 percent more lumber, on the average, than mills now cut. It does this by producing not more but larger pieces from a log of given diameter—thereby putting to its most valuable use wood that otherwise would be trimmed off in cutting square-edged lumber from the cylindrical log. Such trims, of course, are mostly either chipped for lower value pulp or consigned to fuel burners.

Some 7 billion board feet of western softwoods and 8 billion feet of southern pine are produced from small and second-growth logs annually; so the BOF potential is vast and growing.

The name BOF was coined to emphasize the critical importance in terms of maximum yield of the first or opening sawcut on a log. A complex maze of computer computations has shown that where this cut is made it can mean a yield difference of up to 100 percent, with the average of most sawmilling methods around 20 percent.

Principal equipment needed for a mill to put BOF in operation includes a minicomputer, an electronic scanner, and numerically controlled motor-operated log-positioning setworks accurate to 0.002 inch. All are commercially available. Mills cutting upwards of 40,000 board feet a day can make economic use of the system and return the installation investment of something less than $100,000 in the first year.

Recycling: Renewal of a resource

In late 1971, a unique pilot plant designed and operated by Forest Products Laboratory scientists began recovering for reuse some of the municipal trash otherwise hammermilled to bits and buried at a Madison, Wis., municipal landfill site. Almost simultaneously, State and municipal officials—Governors, mayors, public works directors plagued with trash disposal and pollution problems—began coming to see its operation in conjunction with a city of Madison hammermilling plant that tears, breaks, and smashes mixed municipal refuse—glass, metals, cloth, plastics, and wood along with paper—into bits for more efficient and sanitary landfill disposal.

Of the 58 million tons of woodpulp paper and paper products consumed in the United States in 1970, nearly 40 million tons disappeared in the Nation's trash.

The FPL recycling pilot project is designed to demonstrate the feasibility of separating wood fiber from other trash, segregating it into different types, and reusing it in the manufacture of wood fiber products. The objective, of course, is to reduce waste, lower trash disposal costs, retrieve increasingly scarce and valuable raw materials, and reduce pollution. Target products for reuse are panel products of various densities for structural fiberboards, wall paneling, insulation, and the like—long lived products with mass markets. Some fiber, of course, may go back to papermills.

The recovered materials are put through a series of fiberizing and washing operations to remove plastics, dirt, and other impurities. Several grades of fiber are recovered—some suitable for paper, others for building materials. FPL research is concentrating on building materials.

The publicity given by the press and other media to the conservation aspects of using recycled paper products has stimulated intense national interest in this phase of recycling. As a direct result, many consumers believe they can do their bit in conservation by using printing papers, stationery, bags, towels, and other popular products that are merchandised or identified as being made from recycled materials. Annual reports and other specialized publications issued by large corporations and agencies are being printed on stock prominently identified as being recycled material. While the economics involved may not always be favorable in these recycling efforts, many firms consider the public relations values received as being worthwhile. From a conservation education standpoint, the national interest in recycling is beneficial.

Cooperating with FPL in solid waste research are the Bureau of Mines, Department of Interior, and Bureau of Solid Waste Management, Department of Health, Education, and Welfare.

FPL low-cost housing

On the basis of a nationwide survey and other information, it has been conservatively estimated that thousands of houses will be built according to economical construction principles developed by Forest Products Laboratory and incorporated in the five house plans available from the Laboratory.

The 1971 survey involved only persons requesting the plans when first announced in 1969. More than 225 houses were reported to have been built. Several contractors had erected sizeable tracts and projected additional large numbers in subdivisions.

Construction cost figures supplied by those who had already built indicated that the price range targeted by FPL when designing the houses was being maintained at between $7,000 and $12,000. Many plans were modified with extra-cost items such as basements, concrete instead of wood-post foundations, fireplaces, built-ins, and the like.

A number of the houses have been built in rural areas with financing by the Farmers Home Administration, which is available only when private financing cannot be obtained. This USDA agency administers housing loans at subsidized interest rates for low-income rural families under agreement with the U.S. Department of Housing and Urban Development.

Housing concepts in Operation Breakthrough

The Forest Product Laboratory's wealth of structural research experience, built upon 61 years of investigations ranging from the establishment of basic strength and related data to pioneering concepts for engineered wood structures, was brought into sharp focus on national housing problems during 1970–71.

Construction principles such as stressed-skin and sandwich evolved from FPL structural investigations came prominently to the fore in proposals submitted by builders for consideration in the Operation Breakthrough program of the Department of Housing and Urban Development. Of 24 Breakthrough proposals finally accepted for erection in various parts of the United States, FPL furnished technical evaluations for 17 involving wood to a major or minor extent. In some instances, analyses of fire risk, insulation adequacy, and other safety and structural aspects led to the use of wood instead of other materials specified in the original proposals.

FPL has also been requested to evaluate the impact of such technological advances as the new American lumber standard sizes on structural strength and rigidity of housing, and on the use of new materials such as foam insulation on sandwich panel design.

5-Year natural house finish

Long-term research that involved basic studies of radiation effects on wood and means of prevent-

ing them has culminated in an exterior clear-film natural finish with a life expectancy of at least 5 years instead of the 1 or 2 years associated with previous commercial formulations. The new FPL formulations hold promise of providing homeowners with exterior finishes that emphasize the beauty of their wood siding while assuring trouble-free performance comparable with that of high-quality paints.

Wood specimens exposed for more than 5 years outdoors remain in good condition, free of the film loosening and hazing that occur in conventional clear-film natural finishes within a year or two as UV attacks the coating and finally the wood underneath.

New structural test frame

For the first time it is possible for FPL scientists to evaluate a modular assembly of floor, walls, and roof stressed by typical live and dead loads to determine composite performance. Information essential for the more efficient structural design of houses will be developed from experiments with a new structural test frame.

Although admittedly only a stopgap until more complete facilities can be obtained, the structural test frame is yielding highly useful information on the strength and related performance capabilities of various engineered structural components. It was built to test structural assemblies up to 12 feet wide, 24 feet long, and 10 feet high—about half of a small house with a low-pitched roof.

Nondestructive testing progress

As a general rule, softwood construction lumber is visually graded as it comes from the planer. The grade assigned a piece depends on the size and distribution of such defects as knots, cross grain, splits, and checks. The effectiveness of visual grading is due in no small part to research that has established reasonably reliable relationships between defects and strength impairment. Nevertheless, because it is by no means foolproof, allowable stresses are based on heavy penalties for the relatively few exceptionally weak pieces that cannot be sorted out by visual methods.

Forest Products Laboratory research is aimed at elucidating the basic principles of stress grading. Distinct progress has been attained by considering not one single property but several in combination, in attempts to account for higher proportions of strength and stiffness. A recent study of tensile strength demonstrates the possibilities of gaining more rational design stresses. Structural lumber varies greatly in tensile strength, a critical component of the load-carrying capacity of trusses, laminated beams, and other structural members.

If grading methods can be developed that will permit isolation of the few low-strength pieces in each visual grade, a considerable increase in allowable tensile stresses can be realized.

New standard for softwood lumber

A new American softwood lumber standard (PS20–70) became fully effective under the U.S. Department of Commerce voluntary product standard program September 1, 1970. It marked the culmination of many years of effort by the American lumber standard committee, to which the Forest Products Laboratory furnished a technical adviser. The new standard covers softwood lumber sizes, grades, grademarking, and inspection.

Some of the fundamental improvements incorporated have long been advocated by FPL. For the first time, the standard relates lumber sizes to moisture content. Green lumber sizes are required to be larger than those for seasoned lumber, thus assuring that sizes—and strength—will be more nearly uniform when the lumber comes to equilibrium with humidity conditions in service.

Termite poison lure decimates colonies

Strong evidence of the way in which the Forest Products Laboratory's termite attractant-insecticide decimates colonies of wood-destroying termites has been obtained from studies of termite behavior. The method consists of putting treated wood wafers 5 feet apart in the soil around a building. Worker termites pick up poisoned food from the wafers, to which they are lured by the attractant, and carry it back to the nest. There they die. When enough are killed the delicately balanced caste structure of the colony is disrupted, leading to abnormal developments that inflict further mortality. Nest sanitation deteriorates, and mold fungi, mites, and other detrimental organisms flourish, contributing to the colony's destruction.

An outstanding ecological advantage of the method is that it requires only very small amounts of toxic chemicals compared with conventional soil treatments around houses.

Livestock feed from pulpmill, sawmill residues

Satisfaction of the Nation's current demands for paper and paperboard products calls for an annual production of some 40 millions tons of woodpulp fibers. Nearly 2 million tons are lost in papermaking—to be disposed of by burning, landfill, or stream ejection. These residues run the gamut from totally lignified groundwood fines to fully pulped and bleached chemical pulp fines of essentially pure cellulose. Laboratory assays, using digestive juices from a fistulated cow, have indicated a similar range in feeding value—many of the residues providing the energy equivalence of a medium quality hay and and a few even exceeding that of corn. Extensive trials are now underway with sheep and cattle to study the long-range effects of high pulp-waste rations and to develop the basic information needed for qualifying such residues as a useful feedstuff for livestock.

Untreated sawdust, though of a negligible feed value, has been shown to be a suitable roughage substitute for livestock, including both beef and dairy cattle, goats, and sheep. It functions as a saliva stimulant, as does hay, thereby helping allay stomach and liver damage commonly encountered in ruminants being fed high-concentrate diets at feedlots.

In field trials at a Pennsylvania feedlot, dry oak sawdust made up 20 percent in weight of the feed given to 61 head of cattle for 100 days. Average weight gain and carcass quality were deemed highly satisfactory by the commercial feedlot operator.

Grade-yield charts extend walnut supplies

Black walnut, most prized of native hardwoods, can now be used more economically by means of the Forest Products Laboratory's new grade-yield charts specifically devised for the unique national hardwood lumber association rules used to grade this species.

The charts for walnut are an adaptation of charts previously devised for hard maple and generally applicable to all hardwoods except walnut, grading rules for which differ substantially from regular NHLA rules. The walnut charts are published in the U.S. Department of Agriculture, Forest Service Research Paper FPL 162, those for other hardwoods in FPL 118.

Unbarked young trees practical for pulp

Cottonwood trees 1 to 3 years old, grown under conditions that accelerated growth as much as tenfold, were chipped without removing bark and pulped by the kraft process, with intriguing results. Burst and tensile strength were about the same as for pulp made of more mature trees—11 and 24 years old—grown under similar conditions by University of Wisconsin silviculturists; tear strength was about 80 percent that of pulps from the older trees. Trees 3 and 5 years old were also experimented with. Comparable findings were obtained from experiments with fast-grown young sycamore obtained from the Southeastern Forest Experiment Station.

The results indicate that cropping of trees only a few years old may prove feasible for the production of pulps useful for products in which the soft juvenile fibers are desirable.

● Increase the effectiveness and efficiency of Forest Service operations through improvement in organization and management systems.

● During 1970, program management and general administration workloads for all Regions, National Forests, and Ranger Districts were reevaluated and published. System improvements that eliminated much of the cost of reporting and compiling the workload data were implemented.

● During 1970, a new system was developed for a Chief's program and work planning advice. It was used for the first time in 1971. This is the initial step in a new work planning and financial management system currently being implemented. Now the Chief's objectives for the budget year are tied together with financial planning advice.

● As part of its work in promoting the use of current technology for forest management, the INFORM project in the Division of Administrative Management completed a study which related current computer-based information technology to management information needs. A computer needs study was completed during 1970, making recommendations to meet present and projected Forest Service information system computer needs. The results of this study were then used as the basis for selecting and obtaining computer software for use in developing computer-related aspects of a servicewide management information system.

- Forest Service management improvement reports identified $14.1 million of cost savings in fiscal year 1970 and $8.5 million in fiscal year 1971. The reduction in 1971 was largely due to a change in reporting categories. These reports are a summary reflection of managemeent, change—or improvement—over old ways of doing business. Improvement is reported in 11 categories such as improved methods and procedures which amounted to $3.1 million in 1971, and program evaluation which amounted to $2 million in 1971. In addition, during 1971 the Forest Service reported $1.8 million in savings attributed to the governmentwide paperwork management review.

- A major study of servicewide telecommunications needs was essentially completed in 1971. The study deals in depth with the use of electronics in day-to-day administrative activities, and major effort has gone into the development of a proposed system for providing adequate communications on large forest fires.

- A major study of Forest Service computer needs was completed in 1971. The study identified specific needs and the best approach to meet these needs. The study proposes a servicewide computer network, improving regional computer facilities, maximum use of high-speed computer terminals, and the establishment of a national computer center in the West.

- A law enforcement organization study was completed in 1971. Based upon this study, the Forest Service is implementing a new organization for law enforcement and developing new policies and procedures. These include procedures to implement a cooperative law enforcement program based upon Public Law 92–82.

- Based upon a major organizational study completed in 1970, the northeastern and southeastern areas for State and private forestry have implemented a mission-oriented organizational structure in lieu of one that is functionally oriented. The new organization will reduce administrative cost and provide greater flexibility for handling program changes and developing multidiscipline problem-solving teams.

- A major study was initiated to test two new staff organizational approaches on eight national forests in four regions. The objective of this study is to develop an organization to improve coordination of all programs at the forest level and ultimately improve service to the public and do a better overall job of land management. Evaluations of these experimental organizations was begun during 1971.

- Study was completed during 1971 and recommendations approved to make some major organization changes in the southern region (R–8) and the Alaska region (R–10). These changes largely involve a move toward an organization that emphasizes interdisciplinary planning, further decentralization of decisionmaking, and improved coordination of the human and land base resources.

- The number of ranger districts was reduced by 14 in 1970 and 12 in 1971 through consolidation for more effective management. These consolidations resulted in annual operating savings of $378,270 in 1970 and $302,576 in 1971.

- A size-of-forest study was completed in 1970 and implemented during 1971. A new policy on size of National Forest units provides for combining some smaller forests to create larger budgeted forests that can operate more effectively and efficiently.

APPENDIX

Statistical Tables

National Forest and other lands administered by the Forest Service as of June 30, 1970, and June 30, 1971

[In acres]

State and Commonwealth	National Forests and research areas		National Grasslands		Land utilization projects		Total	
	1970	1971	1970	1971	1970	1971	1970	1971
Alabama	633, 341	633, 960	----------	0	--------	0	633, 341	633, 960
Alaska	20, 723, 137	20, 722, 909	----------	0	--------	0	20, 723, 137	20, 722, 909
Arizona	11, 443, 671	11, 422, 820	----------	0	--------	0	11, 443, 671	11, 422, 820
Arkansas	2, 452, 234	2, 454, 189	----------	0	--------	0	2, 452, 234	2, 454, 189
California	20, 031, 456	20, 032, 259	----------	0	19, 115	19, 115	20, 050, 571	20, 051, 374
Colorado	13, 769, 838	13, 746, 925	612, 193	612, 153	560	560	14, 382, 591	14, 359, 638
Connecticut (Insect and Disease Lab, Hamden)	10	10	----------	0	--------	0	10	10
Florida	1, 080, 252	1, 080, 599	----------	0	--------	0	1, 080, 252	1, 080, 599
Georgia	822, 557	827, 830	----------	0	9, 340	9, 340	831, 897	837, 170
Idaho	20, 295, 224	20, 304, 368	47, 599	47, 659	--------	0	20, 342, 823	20, 352, 027
Illinois	242, 215	245, 536	----------	0	324	0	242, 215	245, 536
Indiana	155, 767	159, 638	----------	0	360	324	156, 091	159, 962
Iowa	----------	0	----------	0	--------	360	360	360
Kansas	----------	206	107, 708	107, 708	--------	0	107, 708	107, 914
Kentucky	576, 804	585, 131	----------	0	--------	0	576, 804	585, 131
Louisiana	593, 789	594, 759	----------	0	--------	0	593, 789	594, 759
Maine	49, 551	49, 638	----------	0	465	465	50, 016	50, 103
Michigan	2, 671, 877	2, 682, 469	----------	0	2, 558	1, 656	2, 674, 435	2, 684, 125
Minnesota	2, 781, 110	2, 785, 287	----------	0	--------	0	2, 781, 110	2, 785, 287
Mississippi	1, 135, 362	1, 136, 064	----------	0	--------	0	1, 135, 362	1, 136, 064
Missouri	1, 413, 058	1, 421, 408	----------	0	12, 938	12, 938	1, 425, 996	1, 434, 346
Montana	16, 675, 045	16, 668, 156	----------	0	--------	0	16, 675, 045	16, 668, 156
Nebraska	256, 237	256, 224	94, 344	94, 344	--------	0	350, 581	350, 568
Nevada	5, 086, 063	5, 096, 410	----------	0	--------	0	5, 086, 063	5, 096, 410
New Hampshire	681, 230	683, 161	----------	0	--------	0	681, 230	683, 161
New Mexico	9, 010, 583	8, 967, 128	136, 505	136, 505	92, 217	92, 217	9, 239, 305	9, 195, 850
New York	----------	0	----------	0	13, 779	13, 779	13, 779	13, 779
North Carolina	1, 129, 409	1, 133, 379	----------	0	--------	0	1, 129, 409	1, 133, 379
North Dakota	520	520	1, 104, 438	1, 104, 438	--------	0	1, 104, 958	1, 104, 958
Ohio	140, 548	147, 045	----------	0	--------	0	140, 548	147, 045
Oklahoma	241, 734	243, 433	46, 758	46, 758	--------	0	288, 492	290, 191
Oregon	15, 371, 461	15, 359, 613	106, 036	106, 138	--------	0	15, 477, 497	15, 465, 751
Pennsylvania	494, 654	495, 373	----------	0	--------	0	494, 654	495, 373
Puerto Rico	27, 998	27, 998	----------	0	--------	0	27, 998	27, 998
South Carolina	592, 334	594, 556	----------	0	--------	0	592, 334	594, 556
South Dakota	1, 123, 251	1, 123, 364	862, 450	862, 450	--------	0	1, 985, 701	1, 985, 814
Tennessee	608, 727	612, 416	----------	0	1, 212	1, 212	609, 939	613, 628
Texas	658, 513	658, 763	117, 269	117, 269	--------	0	775, 782	776, 032
Utah	8, 025, 582	8, 027, 498	----------	0	--------	0	8, 025, 582	8, 027, 498
Vermont	241, 197	242, 309	----------	0	--------	0	241, 197	242, 309
Virgin Islands (St. Thomas Experimental Forest)	147	147	----------	0	--------	0	147	147
Virginia	1, 519, 683	1, 531, 262	----------	0	--------	0	1, 519, 683	1, 531, 262
Washington	9, 082, 926	9, 087, 523	----------	0	725	725	9, 083, 651	9, 088, 248
West Virginia	941, 504	947, 215	----------	0	--------	0	941, 504	947, 215
Wisconsin	1, 487, 285	1, 488, 272	----------	0	230	150	1, 487, 515	1, 488, 422
Wyoming	8, 670, 636	8, 673, 862	572, 315	572, 315	--------	0	9, 242, 951	9, 246, 177
Nationwide	182, 938, 520	182, 951, 632	3, 807, 615	3, 807, 737	--------	152, 841	186, 899, 958	186, 912, 210

Forest Service receipts and expenditures, all programs and sources, fiscal years 1970 and 1971

Item	Fiscal year 1971		Fiscal year 1970	
	Receipts	Expenditures	Receipts	Expenditures
National forest programs:				
Cash receipts and appropriation expenditures	$287, 580, 588	$522, 690, 389	$350, 195, 532	$438, 698, 864
Cash receipts from national forest land collected in conjunction with and deposited to accounts of other agencies (Federal Power Commission, Department of the Interior)	33, 052, 575	----------	28, 995, 120	----------
Noncash income and expense (roads built by timber purchasers)	49, 440, 953	49, 440, 953	51, 902, 005	51, 902, 005
Total	370, 074, 116	572, 131, 342	431, 092, 657	490, 600, 869
Forest research programs:				
Forest research appropriations	----------	48, 751, 344	----------	45, 589, 668
Research construction	----------	555, 177	----------	----------
Cooperative research work	744, 924	763, 559	764, 427	861, 913
Total	744, 924	50, 070, 080	764, 427	46, 451, 581
State and private forestry programs:				
Fire protection, tree distribution, and forest management cooperation	----------	24, 110, 635	----------	22, 909, 607
Assistance to States for tree planting	----------	979, 809	----------	1, 014, 710
Insect and disease control	----------	3, 209, 964	----------	2, 577, 505
Flood prevention and watershed protection	----------	3, 843, 182	----------	4, 197, 715
Forest Fire protection "Smokey Bear"	124, 309	116, 338	108, 568	70, 248
Cooperative funds	1, 552, 062	1, 458, 881	1, 077, 219	1, 302, 743
Total	1, 676, 371	33, 718, 809	1, 185, 787	32, 072, 528
Work for other Government agencies and non-Government persons and firms:				
Economic opportunity program	----------	25, 997, 397	----------	27, 700, 371
Public service career program	----------	34, 389	----------	----------
Land water conservation program	[1] 2, 427, 413	14, 570, 349	[2]	18, 132, 194
Insect and disease control (Interior Department lands)	----------	42, 034	----------	49, 430
Miscellaneous work for other Government agencies	6, 571, 698	18, 493, 952	5, 600, 796	8, 711, 744
Work performed for non-Government persons, firms, etc.:				
Cooperative work	1, 060, 440	1, 070, 442	954, 536	977, 804
Reimbursed	2, 872, 229	2, 872, 229	2, 483, 074	2, 483, 074
Total	12, 931, 780	63, 080, 792	9, 038, 406	58, 054, 617
Total receipts and expenditures	385, 427, 191	719, 001, 023	442, 081, 277	627, 179, 595
Internal equipment and supply service (working capital fund) financed primarily by charges included above to Forest Service programs	33, 548, 864	34, 617, 410	28, 809, 851	29, 082, 912

[1] Receipts of $2,384,639 from the sale of Federal recreation area permits, and $42,774 from the sale of surplus property were deposited to the credit of the Department of the Interior (BOR) during fiscal year 1971 and were not included in the receipts from national forest land ($33,052,575) above.

[2] Receipts of $913,349 from the sale of Federal recreation area entrance permits, and $59,990 from the sale of surplus property were deposited to the credit of the Department of the Interior (BOR) during fiscal year 1970, and are not included in the receipts from national forest land ($28,995,120) above.

NOTE.—Expenditures are on an obligation basis, except working capital fund which is on an accrual basis.

Portion of National Forest System receipts distributed to States or counties

Receipts From National Forest Lands

[Fiscal year basis—for fiscal years 1969, 1970, and 1971]

	1969	Portion distributed (paid in fiscal year 1970)	1970	Portion distributed (paid in fiscal year 1971)	1971	Portion distributed (paid in fiscal year 1972)
Receipts [1]	$312, 230, 963		$287, 769, 851		$226, 696, 810	
Payments—25 percent fund (act of May 23, 1908, as amended).		$78, 021, 921		$71, 896, 615		$56, 647, 198
Payments—Arizona-New Mexico school fund (act of June 20, 1910).		124, 709		84, 338		69, 316
Payments—Minnesota Superior National Forest (act of June 22, 1948).		257, 955		258, 006		259, 038
Total	312, 230, 963	78, 404, 585	287, 769, 851	72, 238, 959	226, 696, 810	56, 976, 418

[1] Excludes approximately $7, 413, 381 due counties from fiscal year 1970 receipts on national forest O. and C. lands. This amount was included in total receipts of $9, 884, 508 transferred to Interior. Also excludes approximately $5, 552, 849 due counties from fiscal year 1971 total receipts of $7,403, 799. These amounts are distributed by the Department of Interior under the act of Aug. 28, 1937, as amended.

Excludes approximately $5, 201, 821 due counties from fiscal year 1969 receipts on National Forest O. and C. lands. This amount was included in total receipts of $6, 935, 761 transferred to Interior.

Receipts From National Grasslands and Land Utilizations Areas

[Calendar year basis]

	1969	Portion distributed	1970	Portion distributed	1971	Portion distributed
Receipts	$2, 023, 553		$2, 047, 739		$2, 118, 009	
Distributed by: Payments to counties (act of July 22, 1937).		$505, 888		$511, 935		$529, 502
Total	2, 023, 553	505, 888	2, 047, 739	511, 935	2, 118, 009	529, 502

Recreation use of the National Forests by States,

THOUSANDS OF VISITOR-DAYS

State and Commonwealth	Camping	Picnicking	Recreation travel (mechanized)	Boating	Games and team sports	Waterskiing and other water sports	Swimming and scuba diving	Winter sports	Fishing
Alabama	179. 7	102. 9	163. 6	24. 1	0. 4	7. 9	61. 2	----	63. 9
Alaska	176. 6	76. 8	281. 1	320. 4	2. 8	1. 8	10. 2	38. 3	190. 9
Arizona	2, 221. 7	497. 1	1, 867. 9	173. 0	43. 7	74. 4	219. 2	55. 0	495. 9
Arkansas	404. 4	143. 0	437. 9	98. 6	7. 2	13. 3	180. 0	. 1	284. 3
California	15, 049. 3	1, 366. 1	11, 230. 9	710. 5	261. 7	226. 9	1, 246. 5	1, 574. 3	3, 318. 5
Colorado	3, 037. 6	487. 5	3, 052. 3	131. 0	11. 2	8. 9	12. 8	1, 363. 9	1, 037. 0
Florida	824. 6	124. 8	185. 3	121. 4	3. 6	28. 2	185. 4	----	263. 1
Georgia	412. 3	31. 8	339. 2	27. 6	1. 5	5. 8	24. 0	----	147. 8
Idaho	2, 233. 0	369. 0	1, 860. 1	255. 5	16. 4	36. 8	114. 9	278. 2	1, 176. 2
Illinois	139. 0	67. 7	290. 2	9. 6	. 7	----	39. 1	----	27. 9
Indiana	142. 6	66. 1	196. 1	99. 6	----	27. 7	14. 8	----	175. 9
Kansas	2. 4	8. 4	17. 9	----	----	----	----	----	. 5
Kentucky	153. 9	110. 6	243. 7	51. 3	6. 5	7. 8	9. 9	----	88. 2
Louisiana	242. 1	44. 0	50. 6	13. 9	----	3. 3	75. 4	----	20. 3
Maine	13. 9	3. 3	7. 7	. 2	. 1	----	. 4	----	2. 3
Michigan	830. 2	126. 6	1, 627. 4	123. 9	10. 2	6. 1	96. 6	161. 6	317. 0
Minnesota	1, 134. 6	50. 8	676. 1	549. 8	8. 4	25. 8	92. 4	35. 0	780. 1
Mississippi	152. 8	63. 7	120. 6	11. 8	1. 4	2. 1	30. 6	----	30. 8
Missouri	318. 4	89. 2	297. 8	148. 5	1. 3	5. 7	75. 2	----	111. 4
Montana	1, 248. 8	323. 2	1, 759. 6	129. 4	13. 6	20. 4	51. 7	185. 2	631. 8
Nebraska	17. 6	12. 6	5. 4	. 9	1. 5	. 4	1. 8	----	5. 2
Nevada	296. 8	91. 1	287. 7	1. 1	13. 8	. 3	11. 8	127. 5	79. 4
New Hampshire	562. 2	43. 5	483. 7	. 3	3. 1	. 1	27. 0	203. 6	33. 1
New Mexico	1, 100. 5	314. 6	805. 3	11. 1	16. 5	----	23. 3	183. 1	273. 4
New York	11. 4	2. 5	6. 8	----	----	----	----	----	2. 0
North Carolina	363. 6	139. 6	686. 8	82. 4	2. 1	9. 6	50. 3	----	174. 0
North Dakota	6. 2	4. 0	10. 2	1. 0	----	----	. 3	2. 0	4. 2
Ohio	59. 0	39. 1	247. 4	13. 6	----	----	25. 1	1. 0	15. 0
Oklahoma	50. 3	43. 0	93. 5	8. 8	----	. 8	22. 6	----	46. 2
Oregon	4, 737. 7	750. 8	3, 013. 7	464. 2	21. 2	13. 4	284. 7	494. 6	1, 958. 6
Pennsylvania	571. 9	93. 2	243. 0	128. 5	7. 3	29. 0	44. 1	3. 9	166. 5
South Carolina	82. 8	56. 5	158. 2	43. 1	1. 0	12. 2	9. 6	. 2	65. 0
South Dakota	327. 3	130. 4	841. 8	27. 7	4. 2	1. 8	15. 1	25. 3	95. 3
Tennessee	382. 1	73. 4	307. 3	63. 0	7. 9	20. 9	63. 9	----	119. 2
Texas	473. 3	43. 6	192. 8	60. 9	1. 0	10. 9	33. 2	----	382. 1
Utah	2, 399. 6	497. 8	1, 342. 1	172. 5	43. 5	10. 2	44. 5	409. 2	889. 9
Vermont	56. 7	14. 8	410. 7	. 3	. 1	----	6. 6	384. 0	9. 6
Virginia	603. 9	144. 8	710. 2	11. 8	14. 5	----	62. 0	1. 3	231. 1
Washington	3, 346. 5	474. 1	1, 735. 0	216. 7	20. 0	20. 9	84. 4	855. 5	722. 8
West Virginia	389. 0	56. 4	180. 4	6. 5	4. 8	----	29. 4	----	182. 7
Wisconsin	522. 9	34. 6	453. 9	112. 2	. 2	5. 5	57. 2	15. 9	193. 4
Wyoming	1, 174. 7	204. 0	1, 046. 4	65. 3	24. 7	5. 1	21. 1	146. 7	426. 6
Puerto Rico	. 2	77. 8	54. 1	----	----	----	. 7	----	----
Servicewide	46, 454. 1	7, 494. 8	38, 022. 4	4, 492. 0	578. 1	743. 1	3, 459. 1	6, 545. 6	15, 239. 1

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person 12 hours, 12 persons for 1 hour, or any equivalent

summary of activities, calendar year 1970

OF RECREATION USE[1]

Hunting	Hiking and mountain climbing	Horseback riding	Resort use	Original camp use	Recreation resort use	Gathering forest products	Nature study	View scenes, sports environment	Visitor information (exhibits, talks, etc.)	Total use	Percent of total
126. 9	30. 1	10. 9	----------			18. 2	5. 5	6. 7	22. 1	824. 1	0. 5
158. 4	98. 9	1. 0	21. 1	18. 6	42. 4	6. 1	8. 2	41. 4	43. 3	1, 538. 5	. 9
440. 5	290. 0	126. 1	290. 2	392. 1	289. 5	73. 7	44. 8	178. 0	114. 5	7, 887. 3	4. 6
316. 4	40. 7	28. 2	33. 2	37. 3	15. 8	12. 5	7. 1	115. 8	40. 2	2, 216. 0	1. 3
1, 807. 3	1, 445. 7	401. 1	1, 398. 3	2, 025. 9	3, 975. 1	187. 4	304. 3	1, 211. 7	456. 7	48, 197. 3	27. 9
694. 4	318. 2	249. 3	240. 4	135. 1	247. 4	50. 3	51. 8	303. 7	164. 9	11, 597. 7	6. 7
419. 9	17. 0	12. 9	----------	55. 6	145. 1	9. 8	12. 9	38. 9	14. 7	2, 463. 2	1. 4
287. 8	73. 1	13. 9	12. 9	9. 9	24. 9	4. 4	4. 4	78. 9	16. 4	1, 516. 6	. 9
1, 227. 1	266. 9	209. 4	180. 3	114. 2	282. 1	97. 1	37. 4	280. 9	118. 5	9, 154. 8	5. 3
130. 2	17. 3	25. 4	----------			1. 7	. 5	65. 1	6. 3	828. 7	. 5
45. 6	15. 1	23. 7	----------			18. 0	3. 3	. 8	7. 4	836. 7	. 5
9. 1	----------						. 5	. 2	1. 2	40. 2	. 0
122. 0	77. 4	18. 1	2. 4	4. 4	9. 4	12. 9	2. 0	47. 1	20. 8	988. 4	. 6
126. 1	4. 1	2. 8	----------	20. 7	25. 5	3. 1	2. 3	4. 6	6. 6	645. 2	. 4
5. 1	3. 5	. 2	----------	. 8	----------	. 2	1. 7	1. 6	. 3	41. 3	. 0
576. 5	32. 9	16. 2	5. 0	32. 8	84. 4	57. 7	16. 7	83. 7	37. 3	4, 242. 8	2. 5
251. 5	28. 5	9. 2	88. 1	33. 7	156. 9	30. 4	25. 3	102. 6	26. 1	4, 105. 3	2. 4
240. 6	15. 9	7. 9	----------	13. 3	----------	3. 7	1. 9	3. 4	3. 7	704. 2	. 4
222. 0	38. 2	27. 1	----------	10. 8	----------	13. 0	5. 4	20. 0	21. 2	1, 405. 2	. 8
669. 1	150. 6	143. 2	108. 4	76. 7	341. 6	96. 2	19. 4	184. 4	104. 9	6, 248. 3	3. 6
11. 1	2. 5	2. 0	----------	17. 4	----------	5. 3	1. 8	2. 0	19. 9	187. 4	. 1
131. 5	38. 2	28. 3	----------	48. 1	28. 6	33. 3	21. 2	85. 5	32. 1	1, 356. 3	. 8
22. 4	280. 6	. 2	75. 8	2. 3	----------	1. 1	3. 7	235. 2	8. 7	1, 986. 6	1. 2
427. 9	141. 3	80. 7	9. 3	58. 9	97. 8	92. 9	. 1	155. 3	84. 4	3, 916. 4	2. 3
10. 9	2. 0	1. 0	----------	22. 0	----------	. 9	2. 0	----------		61. 4	. 0
328. 7	118. 0	21. 8	12. 2	3. 6	9. 8	9. 7	8. 4	107. 5	15. 7	2, 143. 8	1. 2
19. 0	1. 9	2. 2	----------			3. 2	. 3	----------	. 8	55. 3	. 0
55. 7	16. 8	22. 3	----------			11. 8	4. 7	7. 8	2. 0	521. 4	. 3
53. 3	9. 2	3. 4	----------			2. 8	2. 4	14. 0	31. 6	381. 9	. 3
1, 357. 7	591. 2	237. 0	759. 1	296. 5	930. 3	123. 1	122. 6	889. 2	237. 1	17, 282. 7	10. 0
289. 0	25. 8	16. 7	. 2	53. 4	86. 7	12. 4	10. 5	346. 2	22. 4	2, 150. 7	1. 2
436. 3	14. 3	12. 1	----------			27. 3	7. 7	18. 7	1. 0	946. 0	. 5
86. 9	22. 3	19. 5	7. 7	30. 7	40. 0	12. 0	8. 5	36. 6	10. 3	1, 743. 4	1. 0
180. 1	46. 1	22. 6	43. 9	78. 0	77. 8	7. 7	4. 6	43. 2	28. 3	1, 570. 0	. 9
118. 3	9. 1	3. 5	7. 9	5. 4	----------	5. 5	4. 1	2. 8	3. 2	1, 357. 6	. 8
627. 9	311. 7	177. 6	240. 7	129. 3	218. 2	41. 0	44. 3	548. 2	116. 1	8, 264. 3	4. 8
66. 8	21. 6	. 8	14. 6	----------		1. 1	. 3	238. 2	2. 9	1, 229. 1	. 7
635. 7	146. 8	40. 4	. 2	40. 7	. 9	12. 6	12. 2	146. 0	46. 1	2, 861. 2	1. 7
648. 5	628. 2	243. 1	226. 0	269. 1	337. 9	227. 8	68. 1	924. 3	116. 2	11, 165. 1	6. 5
244. 8	29. 9	2. 2	----------	46. 7	. 6	4. 7	5. 3	132. 2	13. 6	1, 329. 2	. 8
305. 8	21. 8	6. 0	2. 2	16. 4	11. 5	24. 7	3. 4	3. 8	18. 7	1, 810. 1	1. 0
373. 6	146. 5	117. 8	293. 1	162. 5	273. 6	15. 2	21. 1	149. 3	48. 3	4, 615. 6	2. 7
----------	2. 4	----------	9. 7	49. 6	----------	. 2	. 1	24. 6	6. 6	226. 0	. 1
14, 308. 4	5, 592. 3	2, 387. 8	4, 082. 9	4, 312. 5	7, 553. 8	1, 362. 8	952. 8	6, 880. 1	2, 093. 0	172, 554. 5	100. 0

[1] combination of individual or group use, either continuous or intermittent.

THOUSANDS OF VISITOR-DAYS

State and Commonwealth	Camping	Picnicking	Recreation travel (mechanized)	Boating	Games and team sports	Waterskiing and other water sports	Swimming and skuba diving	Winter sports	Fishing
Alabama	197. 3	101. 8	173. 1	25. 5	1. 3	8. 5	63. 2	----------	68. 0
Alaska	192. 2	83. 8	279. 3	359. 5	6. 8	10. 7	2. 2	48. 0	204. 2
Arizona	1, 930. 8	593. 7	2, 143. 5	240. 1	70. 6	113. 8	233. 3	46. 6	553. 8
Arkansas	476. 8	142. 2	562. 3	103. 4	4. 1	13. 6	185. 7	. 3	311. 0
California [2]									
Colorado	3, 593. 0	499. 9	3, 051. 6	117. 1	17. 6	11. 2	19. 0	1, 434. 8	1, 085. 4
Florida	825. 7	72. 7	198. 3	124. 2	3. 8	39. 6	175. 7	----------	280. 3
Georgia	411. 7	38. 7	351. 4	30. 5	3. 8	14. 1	28. 4	----------	152. 4
Idaho	2, 240. 7	366. 6	2, 135. 9	298. 8	27. 7	40. 3	143. 2	379. 3	1, 138. 2
Illinois	172. 3	70. 0	197. 5	10. 7	1. 1	----------	20. 6	. 1	24. 6
Indiana	131. 3	73. 0	313. 7	116. 4	2. 4	26. 4	20. 6	----------	187. 8
Kansas	3. 0	8. 4	19. 4	----------	----------	----------	----------	----------	. 5
Kentucky	144. 8	99. 4	269. 3	57. 0	3. 1	8. 5	11. 2	----------	95. 2
Louisiana	271. 9	39. 7	52. 3	13. 4	. 3	2. 4	39. 6	----------	19. 5
Maine	11. 2	3. 2	7. 9	. 3	. 1	----------	. 6	----------	1. 9
Michigan	988. 8	130. 7	1, 754. 8	166. 2	12. 5	6. 8	107. 5	----------	187. 8
Minnesota	1, 219. 4	65. 6	630. 0	1, 166. 6	10. 2	26. 9	84. 1	23. 2	368. 5
Mississippi	131. 7	37. 1	142. 8	13. 5	1. 1	2. 4	27. 5	----------	29. 7
Missouri	376. 4	124. 2	348. 4	188. 2	8. 5	6. 6	85. 4	----------	118. 8
Montana	1, 408. 1	298. 1	1, 796. 6	147. 8	17. 1	20. 9	62. 5	365. 2	690. 0
Nebraska	23. 8	17. 5	7. 6	1. 9	2. 8	. 5	3. 6	. 2	5. 9
Nevada	426. 7	119. 7	395. 6	2. 8	24. 9	. 8	15. 5	140. 0	92. 2
New Hampshire	571. 3	36. 9	520. 0	3. 5	. 8	. 1	30. 5	250. 3	11. 3
New Mexico	1, 031. 1	294. 5	797. 2	6. 4	21. 3	----------	6. 6	82. 8	125. 0
New York	12. 5	2. 6	8. 5	----------	----------	----------	----------	----------	2. 1
North Carolina	356. 5	126. 9	690. 3	84. 2	1. 8	9. 9	49. 3	----------	171. 4
North Dakota	4. 9	4. 7	13. 8	1. 3	----------	----------	. 4	2. 8	4. 2
Ohio	70. 8	47. 8	270. 7	18. 5	2. 9	----------	24. 3	1. 0	21. 3
Oklahoma	53. 8	31. 6	112. 6	9. 3	----------	. 8	20. 1	----------	40. 9
Oregon	4, 917. 6	710. 7	4, 282. 5	496. 6	53. 0	97. 4	294. 4	630. 5	1, 664. 3
Pennsylvania	539. 9	55. 6	247. 3	141. 5	3. 5	34. 1	37. 1	2. 6	204. 3
South Carolina	101. 5	59. 0	186. 7	44. 9	1. 1	12. 7	10. 2	. 2	69. 4
South Dakota	355. 4	132. 3	888. 6	33. 1	6. 9	2. 1	22. 3	23. 8	95. 9
Tennessee	442. 4	85. 0	339. 2	76. 1	7. 9	21. 2	61. 1	----------	122. 7
Texas	462. 2	44. 3	201. 4	56. 9	2. 1	11. 2	38. 6	----------	363. 4
Utah	2, 983. 7	589. 4	1, 735. 4	186. 7	75. 2	18. 3	57. 5	492. 1	895. 4
Vermont	53. 6	14. 7	436. 7	1. 3	. 1	----------	8. 3	370. 1	10. 0
Virginia	659. 9	178. 0	843. 5	12. 1	11. 5	. 1	53. 9	1. 3	278. 3
Washington	3, 104. 0	341. 0	1, 852. 1	185. 2	22. 0	14. 6	76. 4	750. 9	602. 1
West Virginia	482. 5	50. 3	161. 9	14. 7	10. 0	2. 4	32. 2	. 1	210. 1
Wisconsin	492. 6	34. 7	539. 1	104. 4	1. 5	7. 4	44. 2	6. 2	208. 2
Wyoming	1, 310. 9	200. 7	1, 086. 5	148. 4	27. 0	6. 0	25. 9	230. 6	494. 3
Puerto Rico	----------	87. 7	43. 4	----------	5. 5	----------	5. 3	----------	----------

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent
[2] Figures not available at time of publication.

use, summary of activities, calendar year 1971

OF RECREATION USE [1]

Hunting	Hiking and mountain climbing	Horseback riding	Resort use	Organization camp use	Recreation residence use	Gathering forest products	Nature study	Viewing scenes, sports environment	Interpretation (exhibits, talks, etc.)	Total use	Percent of total
114.1	28.1	9.8	----	----	----	17.1	5.3	7.9	20.9	841.9	0.5
91.0	85.8	1.3	20.4	17.7	45.5	4.0	10.1	48.2	50.8	1,561.5	.8
427.8	313.0	135.5	294.1	373.1	266.4	80.8	41.5	158.1	210.0	8,256.5	4.5
353.9	48.2	25.9	23.6	27.6	8.5	13.1	6.8	373.9	22.0	2,702.9	1.5
612.8	368.2	235.8	240.8	155.3	227.7	44.1	73.4	646.8	133.2	12,567.7	6.8
491.0	18.6	13.5	----	53.8	146.5	10.7	13.0	46.2	15.8	2,529.4	1.4
289.6	80.8	13.7	12.9	14.1	26.4	3.9	6.1	76.3	25.2	1,580.2	.9
1,030.3	257.4	213.2	178.9	141.4	261.8	80.6	36.5	269.5	135.1	9,405.4	5.1
144.7	27.7	29.5	----	----	----	.9	3.7	73.0	3.4	779.8	.4
52.7	19.4	43.2	----	----	----	19.1	2.8	13.3	21.6	1,043.7	.6
10.6	----	----	----	----	----	----	.5	1.2	.3	43.9	.0
124.9	85.4	19.5	1.4	5.4	11.0	13.0	2.2	55.2	11.6	1,018.1	.6
124.8	4.6	2.7	----	20.7	25.5	4.0	2.7	9.4	8.5	642.0	.3
4.6	3.8	.1	----	.7	----	.2	1.7	1.6	.5	38.4	.0
52.7	19.4	43.2	10.0	26.2	66.6	57.1	12.6	81.3	49.7	4,574.6	2.5
198.1	34.9	5.5	61.2	56.4	159.1	27.0	8.8	9.6	15.5	4,170.6	2.3
271.6	16.4	9.9	----	13.3	----	4.3	2.0	2.4	1.6	707.3	.4
200.0	34.2	30.4	----	9.3	----	4.9	3.9	22.0	51.9	1,613.1	.9
608.7	201.5	162.9	118.1	96.3	665.6	70.6	19.1	246.0	197.6	6,862.7	3.7
17.5	4.5	.9	----	19.5	----	7.8	2.5	4.2	29.9	1,150.6	.1
127.8	45.7	28.9	----	48.7	20.8	35.3	21.6	32.5	66.3	1,645.8	.9
25.2	361.8	1.0	50.5	2.1	----	.9	4.2	295.9	16.2	2,182.5	1.2
330.8	140.4	58.2	.2	51.1	82.7	37.5	12.8	149.9	101.8	3,330.3	1.8
10.9	3.0	1.1	----	18.0	----	.9	2.5	----	.2	62.3	.0
326.7	123.0	21.4	4.2	3.1	9.8	10.3	8.4	104.7	20.7	2,122.6	1.2
39.3	1.8	2.2	----	----	----	2.6	.4	.9	.3	79.6	.0
21.1	14.4	20.9	----	----	----	8.0	----	6.4	9.7	537.8	.3
53.0	13.1	3.2	----	----	----	3.2	2.5	15.0	19.4	378.5	.2
1,145.0	597.7	235.5	635.1	274.9	662.3	111.5	66.2	792.9	181.7	18,019.8	9.8
203.1	23.1	16.1	.3	18.7	79.5	12.3	4.5	355.8	16.6	1,995.9	1.1
354.9	16.5	11.6	----	----	----	26.4	9.0	18.7	5.4	928.2	.5
93.1	21.6	18.2	8.7	41.2	51.8	7.1	15.2	18.7	32.1	1,868.1	1.0
162.2	46.0	24.3	34.2	78.8	80.6	7.8	4.4	39.7	26.0	1,659.6	.9
123.1	9.3	4.1	8.1	11.3	----	5.0	4.2	31.7	11.5	1,388.4	.8
749.9	357.1	214.6	267.1	155.3	227.6	52.2	62.1	351.2	133.2	9,604.0	5.2
45.0	28.1	1.5	43.6	----	1.2	1.1	.5	246.8	17.4	1,280.0	.7
682.3	177.1	51.0	.2	44.8	.8	15.6	12.8	162.6	47.9	3,233.7	1.8
578.1	474.2	180.5	258.0	252.1	265.1	214.7	46.8	595.9	101.1	9,934.8	5.4
150.8	25.0	3.9	----	34.5	.6	6.7	2.8	210.1	19.0	1,417.6	.8
220.0	19.0	2.8	2.3	19.7	11.5	19.2	3.3	3.6	19.6	1,759.3	1.0
310.7	161.3	115.9	244.3	146.2	162.2	13.2	22.1	137.3	45.7	4,889.2	2.7
----	2.9	----	9.3	33.1	1.9	----	----	3.2	30.3	223.1	.1

combination of individual or group use, either continuous or intermittent.

THOUSANDS OF VISITOR-DAYS

State and Commonwealth	Observation sites	Playground sport sites	Boating sites	Swimming sites	Campgrounds	Picnic grounds	Hotel Lodge Resorts
Alabama			2. 5	41. 4	133. 9	110. 0	
Alaska	7. 1		3. 2	5. 5	171. 4	53. 2	22. 9
Arizona	21. 5	15. 4	41. 2	42. 0	1, 694. 5	559. 2	273. 1
Arkansas	15. 9		8. 7	85. 1	336. 5	115. 9	46. 4
California	72. 4	5. 2	296. 6	210. 5	11, 061. 9	726. 0	1, 282. 4
Colorado	77. 2	. 5	107. 1		2, 410. 0	362. 8	195. 7
Florida			39. 8	93. 1	523. 5	84. 4	
Georgia	7. 7		6. 5	22. 0	272. 6	49. 6	12. 9
Idaho	36. 0		44. 4	28. 5	1, 391. 8	107. 4	205. 9
Illinois	41. 4		4. 5	38. 3	117. 4	86. 5	
Indiana	. 1		31. 9	14. 8	144. 1	70. 8	
Kansas	. 2					6. 5	
Kentucky	11. 4		15. 8		160. 8	95. 4	
Louisiana	. 7		7. 5	63. 4	195. 8	37. 6	
Maine	2. 1				14. 2	2. 3	
Michigan	4. 5	8. 1	53. 4	80. 9	592. 0	101. 4	2. 4
Minnesota	1. 5		53. 2	30. 6	554. 8	41. 1	124. 0
Mississippi			7. 5	25. 7	117. 1	55. 1	
Missouri			10. 8	1. 2	267. 8	106. 0	
Montana	73. 6		72. 6	20. 6	1, 014. 1	151. 4	68. 0
Nebraska	2. 1			1. 8	15. 5	12. 2	
Nevada	1. 1			12. 8	235. 5	46. 6	
New Hampshire	20. 0		1. 1	5. 3	527. 8	65. 3	78. 7
New Mexico	37. 4	7. 7	1. 5		697. 0	159. 6	. 9
New York					9. 2	2. 0	
North Carolina	27. 8		14. 6	31. 3	307. 3	154. 4	14. 9
North Dakota					1. 3	2. 5	
Ohio			10. 0	30. 0	53. 0	43. 8	
Oklahoma	18. 5		2. 3	13. 5	56. 6	30. 0	
Oregon	94. 3		330. 0	37. 1	3, 981. 9	430. 1	745. 7
Pennsylvania	16. 9		50. 0	36. 4	451. 1	73. 4	
South Carolina			14. 8	5. 5	55. 8	65. 8	
South Dakota	10. 2	2. 7	10. 4	16. 9	298. 0	163. 1	8. 7
Tennessee	5. 8		11. 3	45. 5	285. 5	94. 0	55. 0
Texas	. 2		14. 7	17. 4	384. 5	55. 8	7. 1
Utah	46. 9	3. 3	54. 4	4. 6	1, 684. 9	308. 0	267. 1
Vermont	3. 2			3. 8	56. 5	13. 8	
Virginia	6. 1		2. 8	50. 3	380. 7	114. 7	. 2
Washington	29. 6		52. 2	16. 9	2, 349. 8	165. 5	165. 1
West Virginia	16. 3		1. 8	25. 1	286. 7	67. 2	
Wisconsin			30. 5	41. 1	442. 2	18. 7	3. 1
Wyoming	100. 8		21. 3	16. 2	827. 3	79. 9	334. 7
Puerto Rico	12. 0			. 2		94. 5	
Servicewide	822. 5	42. 9	1, 430. 9	1, 215. 3	34, 562. 3	5, 183. 5	3, 914. 9

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Less than 0.05 percent.

of developed recreation sites, calendar year 1970

OF RECREATION USE [1]

Organization sites	Other concession sites	Recreation resort sites	Winter sports sites	Visitor centers	Total use	Percent of total	State name
					287. 8	0. 4	Alabama
23. 3		42. 4	18. 5	34. 9	382. 4	. 6	Alaska
509. 2	34. 3	289. 7	30. 7	15. 5	3, 526. 3	5. 2	Arizona
60. 3		15. 8			684. 6	1. 0	Arkansas
2, 648. 5	119. 0	3, 984. 4	1, 351. 0	42. 4	21, 800. 3	32. 2	California
149. 4	71. 6	246. 9	1, 383. 1	4. 5	5, 008. 8	7. 4	Colorado
101. 2		145. 1		1. 4	988. 5	1. 5	Florida
14. 6		25. 4		10. 1	421. 4	. 6	Georgia
174. 0	4. 3	282. 1	270. 1	3. 6	2, 548. 1	3. 8	Idaho
					288. 1	. 4	Illinois
					261. 7	. 4	Indiana
					6. 7	(2)	Kansas
10. 5		9. 4			303. 3	. 5	Kentucky
33. 1		25. 5			363. 6	. 5	Louisiana
. 8					19. 4	(2)	Maine
52. 5	8. 0	87. 4	187. 4		1, 178. 0	1. 7	Michigan
45. 3	1. 9	156. 9	10. 8	2. 9	1, 023. 0	1. 5	Minnesota
16. 3					221. 7	. 3	Mississippi
10. 8					396. 6	. 6	Missouri
100. 5	1. 6	341. 4	214. 1	7. 0	2, 065. 7	3. 1	Montana
36. 6					68. 2	. 1	Nebraska
72. 1		28. 6	124. 6	14. 9	536. 2	. 8	Nevada
2. 3			223. 3	1. 7	925. 5	1. 4	New Hampshire
75. 0	11. 5	97. 8	219. 1	16. 1	1, 323. 6	2. 0	New Mexico
22. 0					33. 2	(2)	New York
3. 6	6. 1	9. 8		5. 4	575. 2	. 9	North Carolina
					3. 8	(2)	North Dakota
					136. 8	. 2	Ohio
					120. 9	. 2	Oklahoma
389. 6	204. 5	823. 5	473. 5	3. 0	7, 513. 2	11. 1	Oregon
74. 6	. 3	86. 7			789. 4	1. 2	Pennsylvania
					141. 9	. 2	South Carolina
39. 0	4. 4	40. 0	19. 2	2. 9	615. 5	. 9	South Dakota
115. 6		77. 8			690. 5	1. 0	Tennessee
9. 7					489. 4	. 7	Texas
167. 7	16. 0	220. 5	383. 9	25. 2	3, 182. 5	4. 7	Utah
			407. 8		485. 1	. 7	Vermont
71. 7		. 9		6. 4	633. 8	. 9	Virginia
381. 9	4. 2	327. 9	973. 9		4, 467. 0	6. 6	Washington
60. 7		. 6		2. 7	461. 1	. 7	West Virginia
22. 0		11. 5	17. 6		586. 7	. 9	Wisconsin
208. 2	. 8	173. 6	171. 2	. 6	1, 934. 6	2. 9	Wyoming
49. 6	9. 7			. 1	166. 1	. 2	Puerto Rico
5, 752. 2	498. 2	7, 551. 6	6, 478. 8	202. 1	67, 655. 2	100	Servicewide

National Forest Recreation—State summary of recreation use,

THOUSANDS OF VISITOR-DAYS

State and Commonwealth	Observation sites	Playground sport sites	Boating sites	Swimming sites	Campgrounds	Picnic grounds	Hotel Lodge Resorts
Alabama			2. 0	43. 9	144. 4	104. 9	
Alaska	7. 2	0. 7	2. 2	5. 2	191. 9	66. 4	21. 0
Arizona	21. 5	14. 5	57. 2	50. 1	1, 624. 3	571. 4	296. 3
Arkansas	16. 0		4. 3	78. 0	361. 1	114. 0	32. 5
California	60. 6	6. 5	268. 6	209. 9	10, 644. 1	697. 6	1, 152. 6
Colorado	79. 0	. 5	120. 2		2, 786. 9	409. 1	194. 7
Florida			38. 2	103. 5	507. 0	80. 3	
Georgia	9. 1		5. 1	23. 6	258. 7	50. 3	12. 9
Idaho	26. 6		66. 2	20. 9	1, 414. 9	125. 1	211. 8
Illinois	40. 5		5. 2	18. 7	122. 3	73. 0	
Indiana	3. 1		36. 6	25. 0	118. 2	81. 9	
Kansas						6. 7	
Kentucky	12. 0		11. 1		145. 2	86. 1	
Louisiana	. 8		3. 7	34. 8	201. 1	55. 4	
Maine	2. 1				11. 6	2. 1	
Michigan	13. 1	6. 8	71. 7	88. 8	787. 2	117. 3	2. 8
Minnesota	2. 7		66. 3	37. 5	584. 6	40. 8	119. 5
Mississippi			5. 6	25. 4	88. 3	34. 6	
Missouri			10. 6	2. 4	353. 9	128. 1	
Montana	140. 3		80. 4	20. 5	1, 136. 4	150. 7	63. 2
Nebraska	2. 2			1. 8	23. 3	15. 5	
Nevada	2. 0			16. 0	331. 2	64. 7	
New Hampshire	72. 9		4. 3	5. 2	537. 2	51. 8	51. 8
New Mexico	43. 3	9. 2	1. 4		761. 3	202. 9	. 2
New York					9. 4	2. 0	
North Carolina	28. 7		16. 2	27. 9	305. 3	141. 6	9. 6
North Dakota					2. 0	4. 0	
Ohio			10. 8	26. 2	53. 1	44. 8	
Oklahoma	17. 2		2. 4	12. 0	50. 5	19. 6	
Oregon	91. 0		325. 4	39. 0	3, 900. 1	430. 2	758. 9
Pennsylvania	37. 0		40. 2	24. 9	447. 1	58. 5	
South Carolina			15. 2	6. 5	61. 5	77. 8	
South Dakota	10. 2	3. 1	17. 8	19. 0	368. 8	107. 1	10. 4
Tennessee	5. 5		5. 8	38. 1	352. 4	99. 9	45. 3
Texas	. 2		16. 3	19. 1	347. 9	56. 9	6. 8
Utah	22. 2	3. 5	64. 9	3. 6	2, 175. 3	325. 2	291. 0
Vermont	3. 6			4. 7	52. 6	12. 4	
Virginia	5. 5		1. 2	42. 2	450. 3	134. 3	. 2
Washington	28. 6		57. 0	14. 6	2, 398. 0	159. 5	209. 3
West Virginia	32. 6		5. 6	24. 9	307. 8	65. 6	
Wisconsin			27. 2	31. 1	468. 6	16. 8	3. 2
Wyoming	81. 2		16. 7	17. 6	845. 9	73. 4	345. 8
Puerto Rico	5. 1			. 1		88. 1	
Servicewide	923. 6	44. 8	1, 483. 6	1, 162. 7	35, 731. 7	5, 248. 4	3, 839. 8

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.
[2] Less than 0.05 percent.

Part I—Use of developed recreation sites, calendar year 1971

OF RECREATION USE [1]

Organization sites	Other concession sites	Recreation residence sites	Winter sports sites	Interpretive sites	Total use	Percent of total	State
					295. 2	0. 5	Alabama
22. 1		45. 5	35. 0	33. 2	431. 4	. 8	Alaska
466. 2	29. 3	295. 0	12. 1	87. 9	3, 525. 8	4. 5	Arizona
43. 5		8. 5		. 3	658. 2	1. 5	Arkansas
2, 706. 2	92. 6	4, 135. 2	1, 403. 1	73. 5	21, 450. 5	29. 6	California
156. 8	72. 7	226. 8	1, 476. 7	31. 6	5, 565. 0	6. 8	Colorado
100. 1		146. 5		4. 1	979. 7	1. 4	Florida
25. 4		26. 9		12. 6	424. 6	. 9	Georgia
187. 6	6. 9	280. 7	379. 8	43. 6	2, 764. 1	5. 1	Idaho
				1. 6	261. 3	. 4	Illinois
				1. 7	266. 5	. 6	Indiana
				. 3	7. 0	(2)	Kansas
8. 0		11. 0			273. 4	. 6	Kentucky
33. 1		25. 5		2. 0	356. 4	. 3	Louisiana
. 9					16. 7	(2)	Maine
46. 0	7. 4	66. 6	165. 7	3. 9	1, 377. 3	2. 5	Michigan
49. 0	2. 0	159. 1	13. 8	4. 1	1, 079. 4	2. 3	Minnesota
16. 3					170. 2	. 4	Mississippi
13. 1				3. 5	511. 6	. 9	Missouri
112. 1	5. 5	335. 4	415. 9	19. 3	2, 479. 7	3. 7	Montana
42. 3					85. 1	. 1	Nebraska
71. 1		20. 8	127. 5	16. 1	649. 4	. 9	Nevada
2. 5			270. 8	6. 1	1, 002. 6	1. 2	New Hampshire
64. 1	. 6	80. 9	95. 6	64. 5	1, 324. 0	1. 8	New Mexico
18. 0					29. 4	(2)	New York
3. 1	. 8	9. 8		9. 3	552. 3	1. 2	North Carolina
					6. 0	(2)	North Dakota
				. 4	135. 3	. 3	Ohio
				1. 0	102. 7	. 2	Oklahoma
385. 1	194. 9	821. 5	594. 0	12. 6	7, 552. 7	9. 8	Oregon
26. 4	. 5	79. 5		3. 5	717. 6	1. 1	Pennsylvania
					161. 0	. 5	South Carolina
49. 5	5. 2	51. 8	16. 4	16. 7	676. 0	1. 0	South Dakota
114. 8		80. 6		4. 0	746. 4	. 9	Tennessee
20. 1				5. 6	472. 9	. 8	Texas
203. 1	16. 2	229. 5	460. 8	44. 9	3, 840. 2	5. 2	Utah
		1. 2	421. 6		496. 1	. 7	Vermont
64. 5		. 8		11. 9	710. 9	1. 8	Virginia
310. 8	4. 5	277. 3	826. 5	1. 8	4, 287. 9	5. 4	Washington
47. 2		. 6		3. 0	487. 3	. 8	West Virginia
27. 0	1. 5	11. 5	6. 5	3. 2	595. 1	1. 0	Wisconsin
191. 7	9. 8	162. 2	238. 9	5. 4	1, 980. 3	2. 7	Wyoming
52. 1		1. 8			157. 0	. 1	Puerto Rico
5, 689. 8	450. 4	7, 592. 5	6, 961. 7	533. 2	69, 662. 2	100. 0	Servicewide

National Forest Recreation—State summary of recreation use—part II—use of dispersed type recreation areas, calendar year 1970

THOUSANDS OF VISITOR-DAYS OF RECREATION USE [1]

State and Commonwealth	Roads	Trails	Waters	General undeveloped country	Total dispersed use	Percent of Total
Alabama	176. 2	15. 1	123. 8	221. 2	536. 3	0. 5
Alaska	277. 1	74. 3	549. 1	255. 6	1, 156. 1	1. 1
Arizona	1, 928. 0	145. 9	869. 2	1, 417. 9	4, 361. 0	4. 2
Arkansas	549. 3	. 2	485. 6	496. 3	1, 531. 4	1. 5
California [2]						
Colorado	2, 983. 9	493. 9	1, 129. 4	1, 981. 7	6, 588. 9	6. 3
Florida	202. 9	----------	483. 0	788. 8	1, 474. 7	1. 4
Georgia	391. 4	49. 9	170. 7	483. 2	1, 094. 2	1. 0
Idaho	1, 871. 1	423. 5	1, 490. 5	2, 820. 8	6, 605. 9	6. 3
Illinois	203. 7	28. 0	38. 9	262. 0	532. 6	. 5
Indiana	224. 5	7. 4	275. 8	67. 3	575. 0	. 5
Kansas	18. 1	----------	. 5	14. 9	33. 5	(2)
Kentucky	271. 8	59. 0	145. 5	208. 8	685. 1	. 7
Louisiana	52. 1	4. 3	39. 8	185. 4	281. 6	. 3
Maine	7. 8	3. 7	3. 2	7. 2	21. 9	(2)
Michigan	1, 475. 1	88. 8	477. 4	1, 023. 5	3, 064. 8	2. 9
Minnesota	531. 9	79. 3	1, 505. 1	966. 0	3, 082. 3	2. 9
Mississippi	127. 0	6. 9	45. 2	303. 4	482. 5	. 5
Missouri	337. 1	10. 9	323. 4	337. 7	1, 008. 6	1. 0
Montana	1, 595. 7	256. 2	745. 4	1, 585. 3	4, 182. 6	4. 0
Nebraska	7. 0	2. 2	6. 5	23. 5	39. 2	(2)
Nevada	329. 3	38. 6	82. 2	370. 0	820. 1	. 8
New Hampshire	447. 5	295. 8	47. 6	271. 2	1, 062. 1	1. 0
New Mexico	819. 9	90. 1	261. 5	1, 421. 3	2, 592. 8	2. 5
New York	3. 5	5. 3	2. 5	16. 9	28. 2	(2)
North Carolina	697. 4	91. 9	287. 9	491. 4	1, 568. 6	1. 5
North Dakota	10. 5	----------	7. 2	33. 8	51. 5	(2)
Ohio	273. 5	5. 1	25. 6	80. 4	384. 6	. 4
Oklahoma	120. 4	----------	66. 2	74. 4	261. 0	. 2
Oregon	3, 170. 5	610. 7	2, 443. 5	3, 544. 8	9, 769. 5	9. 3
Pennsylvania	567. 8	14. 0	279. 2	500. 3	1, 361. 3	1. 3
South Carolina	174. 2	7. 6	113. 8	508. 5	804. 1	. 8
South Dakota	845. 8	9. 8	110. 2	162. 1	1, 127. 9	1. 1
Tennessee	324. 8	33. 4	200. 9	320. 4	879. 5	. 8
Texas	192. 6	6. 7	471. 2	197. 7	868. 2	. 8
Utah	1, 700. 1	322. 8	1, 115. 4	1, 943. 5	5, 081. 8	4. 8
Vermont	628. 6	21. 4	11. 1	82. 9	744. 0	. 7
Virginia	804. 1	144. 6	251. 8	1, 026. 9	2, 227. 4	2. 1
Washington	2, 303. 4	758. 3	973. 4	2, 663. 0	6, 698. 1	6. 4
West Virginia	257. 1	34. 7	190. 1	386. 2	868. 1	. 8
Wisconsin	429. 0	8. 7	322. 1	463. 6	1, 223. 4	1. 2
Wyoming	993. 3	183. 9	479. 2	1, 024. 6	2, 681. 0	2. 6
Puerto Rico	54. 3	2. 2	. 7	2. 7	59. 9	. 1

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Figures not available at time of publication.

National Forest Recreation—State summary of recreation use, part II—use of dispersed recreation areas, calendar year 1971

THOUSANDS OF VISITOR-DAYS OF RECREATION USE [1]

State and Commonwealth	Roads	Trails	Lakes/ponds	Reservoirs	Rivers/ streams	Oceans/ great lakes	General undeveloped area	Total use	Total use developed and dispersed
Alabama	187. 1	13. 0	6. 1	71. 9	50. 5	-------	218. 1	546. 7	841. 9
Alaska	272. 7	57. 0	50. 8	1. 2	75. 6	490. 4	182. 4	1, 130. 1	1, 561. 5
Arizona	2, 209. 7	138. 2	3. 8	773. 4	205. 3	-------	1, 400. 3	4, 730. 7	8, 256. 5
Arkansas	849. 0	1. 8	----------	335. 6	199. 9	-------	658. 4	2, 044. 7	2, 702. 9
California [2]									
Colorado	3, 094. 3	500. 0	241. 0	421. 2	547. 5	-------	2, 198. 7	7, 002. 7	12, 567. 7
Florida	219. 8	----------	378. 2	7. 0	117. 8	-------	826. 9	1, 549. 7	2, 529. 4
Georgia	404. 6	58. 8	----------	71. 9	132. 3	-------	488. 0	1, 155. 6	1, 580. 2
Idaho	2, 075. 2	436. 9	345. 9	282. 1	908. 1	-------	2, 593. 1	6, 641. 3	9, 405. 4
Illinois	177. 0	32. 2	3. 4	18. 5	16. 7	-------	270. 7	518. 5	779. 8
Indiana	231. 1	45. 8	----------	258. 2	49. 7	-------	192. 4	777. 2	1, 043. 7
Kansas	19. 5	----------		. 6	----------		16. 8	36. 9	43. 9
Kentucky	299. 0	62. 6	----------	71. 9	94. 2	-------	217. 0	744. 7	1, 018. 1
Louisiana	53. 1	4. 7	----------	15. 7	25. 1	-------	187. 0	285. 6	642. 0
Maine	7. 9	4. 0	1. 7	. 5	. 8	-------	6. 8	21. 7	38. 4
Michigan	1, 569. 2	118. 6	300. 9	24. 1	209. 1	-------	975. 4	3, 197. 3	4, 574. 6
Minnesota	520. 1	48. 2	1, 449. 7	8. 3	185. 6	-------	879. 3	3, 091. 2	4, 170. 6
Mississippi	149. 6	7. 0	2. 8	16. 5	31. 5	-------	329. 7	537. 1	707. 3
Missouri	390. 2	22. 3	----------	178. 7	206. 9	-------	303. 4	1, 101. 5	1, 613. 1
Montana	1, 675. 5	362. 9	222. 0	188. 4	426. 6	-------	1, 507. 6	4, 383. 0	6, 862. 7
Nebraska	11. 0	2. 5	----------	8. 5	. 6	-------	42. 9	65. 5	150. 6
Nevada	401. 5	57. 9	8. 1	10. 2	82. 6	-------	436. 1	996. 4	1, 645. 8
New Hampshire	491. 8	372. 5	7. 3	1. 6	22. 1	-------	284. 6	1, 179. 9	2, 182. 5
New Mexico	819. 3	96. 9	14. 6	41. 7	80. 9	-------	952. 9	2, 006. 3	3, 330. 3
New York	4. 7	6. 5	----------	2. 6	----------		19. 1	32. 9	62. 3
North Carolina	701. 7	94. 3	4. 1	134. 5	151. 7	-------	484. 0	1, 570. 3	2, 122. 6
North Dakota	12. 7	----------		3. 8	4. 1	-------	53. 0	73. 6	79. 6
Ohio	306. 2	6. 6	----------	24. 7	15. 7	-------	49. 3	402. 5	537. 8
Oklahoma	126. 8	5. 4	----------	30. 5	28. 6	-------	84. 5	275. 8	378. 5
Oregon	4, 399. 4	688. 6	639. 6	574. 6	1, 006. 3	-------	3, 158. 6	10, 467. 1	18, 019. 8
Pennsylvania	521. 5	12. 6	----------	182. 4	149. 4	-------	412. 4	1, 278. 3	1, 995. 9
South Carolina	199. 4	10. 0	. 9	64. 8	55. 5	-------	436. 6	767. 2	928. 2
South Dakota	879. 2	11. 4	----------	95. 4	34. 4	-------	171. 7	1, 192. 1	1, 868. 1
Tennessee	344. 2	46. 8	----------	112. 6	107. 0	-------	302. 6	913. 2	1, 659. 6
Texas	208. 6	5. 9	. 6	432. 1	16. 5	-------	251. 8	915. 5	1, 388. 4
Utah	1, 880. 4	347. 6	131. 0	553. 0	472. 0	-------	2, 379. 8	5, 763. 8	9, 604. 0
Vermont	663. 2	28. 0	2. 6	3. 1	8. 0	-------	79. 0	783. 9	1, 280. 0
Virginia	957. 7	178. 6	----------	62. 1	240. 3	-------	1, 084. 1	2, 522. 8	3, 233. 7
Washington	2, 146. 6	660. 2	313. 1	98. 7	395. 2	4. 9	2, 028. 2	5, 646. 9	9, 934. 8
West Virginia	301. 0	37. 5	. 8	21. 8	206. 0	-------	363. 2	930. 3	1, 417. 6
Wisconsin	500. 8	21. 0	227. 0	23. 1	84. 2	-------	308. 1	1, 164. 2	1, 759. 3
Wyoming	1, 018. 0	200. 1	139. 8	103. 4	318. 1	-------	1, 129. 5	2, 908. 9	4, 889. 2
Puerto Rico	57. 9	2. 9	----------		5. 2	-------	. 1	66. 1	223. 1

[1] Recreation use of National Forest land and water which aggregates 12 person-hours. May entail 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Figures not available at time of publication.

Summary of Forest Service developed recreation sites by type, number, capacity, and size (as of June 30, 1970)

NATIONAL FOREST SYSTEM

Type of facility	Number of sites classed according to persons at 1-time capacity									Acres	
	Under 25	26 to 75	76 to 150	151 to 300	301 to 600	101 to 1,000	Over 1,000	Total	Total capacity (PAOT)	Developed site portion	Peripheral portion
Observation sites	186	169	66	17	4	2	------	444	26,002	910	21,106
Playgrounds, parks, sports sites	1	4	6	5	3	1	------	20	4,097	486	583
Water sports sites:											
Boating	260	256	148	79	34	3	3	783	71,383	1,674	2,970
Swimming	9	80	89	91	29	8	5	311	64,568	716	753
Subtotal	269	336	237	170	63	11	8	1,094	135,951	2,390	3,723
Campgrounds:											
Family type	1,841	1,638	856	511	157	19	9	5,076	896,404	156,319	52,066
Group type	8	39	30	20	6	1	1	105	14,585	1,062	943
Picnic grounds:											
Family type	566	671	237	96	37	2	------	1,609	104,379	7,122	13,779
Group type	1	22	17	20	5	----------		65	9,241	341	446
Subtotal (campgrounds, picnic)	2,416	2,415	1,140	647	205	22	10	6,855	524,609	164,844	67,234
Hotels, Lodges, Resorts:											
Forest Service	2	6	3	3	-------	1	1	16	3,607	237	240
Private	59	180	78	42	11	3	2	375	36,592	2,716	2,096
Subtotal	61	186	81	45	11	4	3	391	40,199	2,953	2,336
Organization camps:											
Forest Service	4	22	25	13	------	1	------	65	7,493	966	869
Private	56	110	193	117	20	1	2	499	65,807	5,863	4,621
Subtotal	60	132	218	130	20	2	2	564	73,300	6,829	5,490
Concession sites	48	66	22	4	5	2	1	148	13,233	696	3,407
Recreation residence sites	1,274	320	208	107	41	8	3	1,961	97,650	16,232	15,287
Winter sports sites	3	8	19	33	28	20	93	204	355,708	23,137	34,739
Visitors centers	8	11	5	6	3	2	1	36	7,305	339	932
Total, all types	4,326	3,647	2,002	1,164	383	74	121	11,717	1,278,054	218,816	154,837

Summary of Forest Service developed recreation sites, number, capacity, and size (as of June 30, 1971)

NATIONAL FOREST SYSTEM

Type of facility	Number of sites classed according to persons at 1-time capacity									Acres	
	Under 25	26 to 75	76 to 150	151 to 300	301 to 600	601 to 1,000	Over 1,000	Total	Total capacity (PAOT)	Developed site portion	Peripheral portion
Observation sites	173	158	62	14	3	2	------	412	23, 827	918	21, 477
Playgrounds, parks, sports sites	2	4	6	5	3	1	------	21	4, 117	506	814
Water sports sites:											
Boating	257	271	151	83	34	4	3	803	74, 456	1, 705	3, 126
Swimming	8	80	87	103	29	7	5	319	65, 731	778	1, 064
Subtotal	265	351	238	186	63	11	8	1, 122	140, 187	2, 483	4, 190
Campgrounds:											
Family type	1, 857	1, 675	885	504	157	20	10	5, 108	409, 753	36, 649	50, 992
Group type	11	48	35	19	8	1	1	123	16, 250	1, 183	1, 141
Picnic grounds:											
Family type	540	672	228	98	34	2	------	1, 574	102, 071	7, 003	12, 658
Group type	2	22	21	19	5	----------		69	9, 461	352	454
Subtotal (campgrounds, picnic)	2, 410	2, 417	1, 169	640	204	23	11	6, 874	537, 535	45, 187	65, 245
Hotel, lodges, resorts:											
Forest Service	2	7	3	2	------	1	1	16	3, 415	237	304
Private	58	173	81	42	12	1	2	369	35, 061	2, 702	2, 085
Subtotal	60	180	84	44	12	2	3	385	38, 476	2, 939	2, 389
Organization camps:											
Forest Service	3	20	27	12	------	1	------	63	7, 455	957	843
Private	57	107	194	119	19	1	2	499	66, 260	5, 868	4, 811
Subtotal	60	127	221	131	19	2	2	562	73, 715	6, 825	5, 654
Concession sites	47	63	23	4	5	3	1	146	14, 183	722	2, 715
Recreation residence sites	1, 268	318	208	110	37	7	3	1, 951	96, 178	16, 171	15, 262
Winter sports sites	3	8	20	30	27	24	94	206	360, 993	23, 444	36, 924
Interpretive sites:											
Major	4	11	6	9	3	2	1	36	8, 011	393	4, 289
Minor	60	52	28	12	3	1	------	156	11, 249	452	7, 167
Administrative	38	8	2	----------				48	1, 035	74	98
Information sites	27	14	9	9	3	2	------	64	6, 841	122	126
Subtotal	129	85	45	30	9	5	1	304	27, 136	1, 041	11, 680
Total, all types	4, 417	3, 711	2, 076	1, 194	382	80	123	11, 983	1, 316, 347	100, 236	166, 350

Estimated legal harvest of principal big-game animals[1] in National Forests, National Grasslands, and land utilization projects, fiscal year 1970

State	Deer	Elk	Bear	Antelope	Moose	Turkey[2]
Alabama	1, 847	----------	25	----------	----------	567
Alaska	7, 705	120	852	----------	836	----------
Arizona	8, 946	886	154	112	----------	2, 007
Arkansas	2, 282	----------	----------	----------	----------	609
California	24, 326	641	760	126	----------	----------
Colorado	58, 887	20, 767	390	604	----------	266
Florida	1, 427	----------	18	----------	----------	264
Georgia	3, 686	----------	----------	----------	----------	109
Idaho	56, 159	13, 397	1, 776	789	148	32
Illinois	2, 034	----------	----------	----------	----------	23
Indiana	420	----------	----------	----------	----------	4
Kansas	13	----------	----------	----------	----------	----------
Kentucky	276	----------	----------	----------	----------	8
Louisiana	2, 050	----------	----------	----------	----------	----------
Maine	109	----------	----------	----------	----------	----------
Michigan	19, 519	----------	209	----------	----------	65
Minnesota	10, 410	----------	263	----------	----------	----------
Mississippi	3, 651	----------	----------	----------	----------	573
Missouri	3, 386	----------	----------	----------	----------	436
Montana	40, 836	10, 633	1, 521	374	490	----------
Nebraska	575	----------	----------	198	----------	103
Nevada	7, 210	2	----------	21	----------	----------
New Hampshire	1, 018	----------	70	----------	2	----------
New Mexico	16, 385	621	203	25	----------	614
New York	200	----------	----------	----------	----------	----------
North Carolina	2, 599	----------	96	----------	----------	9
North Dakota	2, 335	----------	----------	125	----------	----------
Ohio	43	----------	----------	----------	----------	12
Oklahoma	450	----------	----------	----------	----------	40
Oregon	62, 210	7, 457	918	41	----------	16
Pennsylvania	7, 660	----------	29	----------	----------	1, 085
South Carolina	2, 416	----------	----------	----------	----------	182
South Dakota	13, 864	----------	----------	800	----------	754
Tennessee	650	----------	18	----------	----------	44
Texas	1, 018	----------	----------	1	----------	----------
Utah	52, 931	1, 346	31	27	22	14
Vermont	915	----------	42	----------	----------	----------
Virginia	10, 702	----------	165	----------	----------	4, 291
Washington	15, 019	5, 463	1, 279	----------	----------	20
West Virginia	2, 982	----------	67	----------	----------	1, 506
Wisconsin	5, 942	----------	186	----------	----------	----------
Wyoming	36, 548	13, 200	294	2, 870	724	557
Total	493, 000	75, 000	9, 400	6, 100	2, 200	14, 000

[1] Legal harvest of other big-game animals for all lands administered by the Forest Service includes 3,400 peccary, 1,500 mountain goats, 300 bighorn sheep, 50 Dall sheep, and 230 wild boar.

[2] Turkey classed as a big-game species for this report.

NOTE.—Total figures rounded.

Estimated legal harvest of principal big-game animals [1] in National Forests, National Grasslands, and land utilization projects, fiscal year 1971

State	Deer	Elk	Bear	Antelope	Moose	Turkey [2]
Alabama	1, 518	43	14			826
Alaska	9, 140	67	565		747	
Arizona	9. 080	765	166	165		2, 576
Arkansas	2, 543					692
California	17, 739	21	475	76		10
Colorado	42, 893	15, 852	341	655		217
Florida	1, 301		16			305
Georgia	3, 840					118
Idaho	51, 118	13, 137	1, 824	731	137	71
Illinois	2, 500					127
Indiana	310					3
Kansas	7					
Kentucky	278					4
Louisiana	2, 000					
Maine	95					
Michigan	13, 836		225			50
Minnesota	6, 840		232			
Mississippi	3, 929					653
Missouri	3, 494		5			677
Montana	39, 324	10, 727	1, 446	386	466	75
Nebraska	535			167		171
Nevada	11, 092	6	2	30		
New Hampshire	599		24			
New Mexico	19, 225	565	194	25		845
New York	219					
North Carolina	2, 773		131			17
North Dakota	2, 136			321		100
Ohio	69					16
Oklahoma	480					
Oregon	57, 256	8, 407	820	53		21
Pennsylvania	9, 174	344	20			962
South Carolina	3, 638					256
South Dakota	11, 352	180	70	918		265
Tennessee	775					59
Texas	888			1		40
Utah	71, 005	3, 781	33	178	224	16
Vermont	710		30			
Virginia	11, 139		220			3, 876
Washington	14, 603	5, 609	984			24
West Virginia	3, 132		33			1, 651
Wisconsin	4, 200		219			
Wyoming	33, 501	13, 184	285	2, 690	800	542
Total	471, 000	73, 000	8, 400	6, 400	2, 400	15, 000

[1] Legal harvest of other big-game animals for all lands administered by the Forest Service includes 3,000 peccary, 1,400 mountain goats, 400 bighorn sheep, 80 Dall sheep, and 240 wild boar.

[2] Turkey classed as a big-game species for this report.

NOTE.—Total figures rounded.

Wildlife habitat improvement on National Forests and National Grasslands, fiscal years 1970–71

Project	Accomplishment	
	1970	1971
(*a*) Wildlife food and cover improvements:		
Seeding and planting forage	61,010 acres	89,798 acres.
Release of forage plants	28,307 acres	48,008 acres.
Prescribed burning	64,882 acres	66,965 acres.
Protecting key wildlife areas	11,240 acres	2,979 acres.
Permanent wildlife openings	14,743 acres	16,329 acres.
(*b*) Small water developments for wildlife:		
Ponds, troughs, guzzlers, etc.	958 items	981 items.
Waterfowl wetland improvement	5,779 acres	5,160 acres.
(*c*) Fish stream improvements:		
Channel structures	617 items	3, 682 items.
Spawnbed improvement	1,038 rods	2,869 rods.
Stream barrier removal	761 items	668 items.
Protecting stream channels	2,184 rods	4,921 rods.
Rough fish removal	13 miles	45 miles.
(*d*) Fish lake improvements:		
New fishing lakes	722 acres	714 acres.
Fish shelters and spawnbeds	269 items	35 items.
Aquatic plant control	1,882 acres	1,482 acres.
Rough fish removal	39,743 acres	42,838 acres.

Annual Grazing Statistical Report, calendar year 1969

FOREST SERVICE, USDA

[National Forest System, All Regions]

Item	Cattle and horses		Sheep and goats		Swine		Total	
	Livestock	Animal mos.	Livestock	Animal mos.	Livestock	Animal mos.	Livestock	Animal unit mos.
1. Estimated grazing capacity net suitable National Forest Service land	1, 476, 121	6, 820, 051	2, 153, 182	5, 435, 462	3	36	3, 629, 303	7, 907, 143
2. Permitted to graze:								
(*a*) Paid permit	1, 337, 587	6, 659, 748	1, 861, 084	5, 111, 425	2	24	3, 198, 671	7, 682, 033
(*b*) Exempt provision	150, 785	89, 714	5, 355	9, 015			156, 140	91, 517
(*c*) Other paid permit	5, 936	32, 798	1, 170	884	3	36	7, 106	32, 974
Total	1, 494, 308	6, 782, 260	1, 867, 609	5, 121, 324	5	60	3, 361, 917	7, 806, 524
3. Authorized nonuse	83, 186	429, 186	294, 163	761, 495			377, 349	581, 485
4. Actually grazed:								
(*a*) Paid permit	1, 312, 166	6, 277, 697	1, 801, 887	4, 627, 753	2	24	3, 114, 053	7, 203, 247
(*b*) Exempt provision	152, 175	87, 461	5, 297	8, 118			157, 472	89, 084
(*c*) Unauthorized use	18, 661	36, 947	19, 570	7, 000	6, 982	65, 250	38, 231	38, 347
(*d*) Other paid permit	6, 033	31, 699	1, 140	854	3	24	7, 173	31, 869
Total	1, 489, 035	6, 433, 804	1, 827, 894	4, 643, 725	6, 987	65, 298	3, 316, 929	7, 362, 547
5. Estimated grazing capacity waived private land	75, 964	325, 693	94, 199	226, 428			170, 163	370, 978
6. Permitted under private land permit	72, 589	309, 799	101, 216	225, 142			173, 805	354, 827
7. Actually grazed—private land permit	69, 398	285, 100	86, 384	193, 474			155, 782	323, 794
8. Permitted under crossing permit	89, 143		557, 581				646, 724	

	Cattle and horses	Sheep and goats	Swine	Total
9. Paid permits (number)	16, 704	1, 517	1	18, 222
10. Exempt owners (number)				68, 515
11. Private land permits (number)	1, 785	170		1, 955
12. Crossing permits (number)	451	367		818
13. Losses:				
(*a*) Poisonous plants	1, 800	5, 953		
(*b*) Predatory animals	597	34, 959		
(*c*) Other	9, 646	22, 031	1	
Total	12, 043	62, 943	1	

Annual grazing statistical report, calendar year 1970

FOREST SERVICE, USDA

[National Forest System, All Regions]

Item	Cattle and horses		Sheep and goats		Swine		Total	
	Livestock	Animal mos.	Livestock	Animal mos.	Livestock	Animal mos.	Livestock	Animal unit mos
1. Estimated grazing capacity net suitable National Forest Service land	1, 475, 680	7, 014, 776	2, 248, 463	5, 514, 311	2	24	3, 724, 143	8, 117, 638
2. Permitted to graze:								
(*a*) Paid permit	1, 339, 596	6, 635, 014	1, 774, 720	4, 862, 650	2	24	3, 114, 316	7, 607, 544
(*b*) Exempt provision	168, 933	96, 297	6, 164	12, 793			175, 097	98, 855
(*c*) Other paid permit	6, 711	30, 255	1, 380	2, 100			8, 091	30, 675
Total	1, 515, 240	6, 761, 566	1, 782, 264	4, 877, 543	2	24	3, 297, 504	7, 737, 074
3. Authorized nonuse	91, 550	441, 261	322, 455	839, 119			414, 005	609, 084
4. Actually grazed:								
(*a*) Paid permit	1, 309, 712	6, 258, 308	1, 724, 892	4, 446, 174			3, 034, 604	7, 147, 542
(*b*) Exempt provision	165, 479	93, 010	5, 666	10, 720			171, 145	95, 154
(*c*) Unauthorized use	13, 122	29, 034	8, 831	3, 857	5, 700	59, 992	21, 953	29, 805
(*d*) Other paid permit	6, 989	29, 868	1, 350	2, 610			8, 339	30, 390
Total	1, 495, 302	6, 410, 220	1, 740, 739	4, 463, 361	5, 700	59, 992	3, 236, 041	7, 302, 891
5. Estimated grazing capacity waived private land	89, 043	363, 291	97, 979	236, 410			187, 022	410, 573
6. Permitted under private land permit	77, 871	310, 083	96, 525	241, 727			174, 396	358, 428
7. Actually grazed—private land permit	74, 300	287, 554	87, 631	201, 470			161, 931	327, 848
8. Permitted under crossing permit	93, 544		557, 433				650, 977	

	Cattle and horses	Sheeps and goats	Swine	Total
9. Paid permits (number)	16, 482	1, 390		17, 872
10. Exempt owners (number)				80, 901
11. Private land permits (number)	1, 763	172		1, 935
12. Crossing permits (number)	442	377		819
13. Losses:				
(*a*) Poisonous plants	2, 320	6, 000		
(*b*) Predatory animals	845	32, 643		
(*c*) Other	9, 659	16, 175		
Total	12, 824	54, 818		

Volume and value of timber cut and sold in National Forests; timber stand improvement, and area planted and seeded to trees, fiscal year 1970

State	Sales	Timber sold		Timber cut		Timber stand improvement fiscal year 1970	Acres planted and seeded to trees	
		Volume	Value	Volume	Value		Fiscal year 1970	Accumulative total planted and seeded, June 30, 1970
	Number	*M. Bd. Ft.*	*Dollars*	*M. bd. ft.*	*Dollars*	*Acres*	*Acres*	*Acres*
Alabama	389	53, 755	1, 660, 604	43, 075	1, 201, 647	2, 641	8, 924	125, 249
Alaska	51	314, 208	4, 594, 102	496, 100	3, 226, 555	----------	----------	5, 085
Arizona	916	347, 323	7, 025, 107	270, 330	4, 100, 708	25, 074	3, 393	17, 390
Arkansas	759	164, 561	4, 577, 128	116, 761	3, 752, 030	12, 107	9, 559	102, 841
California	5, 973	2, 236, 114	55, 213, 249	2, 047, 090	54, 126, 593	37, 264	29, 383	347, 708
Colorado	864	209, 611	2, 373, 246	190, 846	2, 056, 094	3, 367	7, 642	132, 724
Connecticut	----------	----------	----------	----------	----------	----------	----------	----------
Delaware	----------	----------	----------	----------	----------	----------	----------	----------
Florida	215	99, 425	2, 283, 499	95, 474	2, 056, 113	1, 587	12, 418	118, 909
Georgia	380	60, 282	1, 669, 995	58, 076	1, 666, 885	1, 662	2, 302	62, 455
Hawaii	----------	----------	----------	----------	----------	----------	----------	----------
Idaho	1, 969	1, 383, 023	18, 469, 009	997, 604	13, 988, 145	7, 748	33, 015	320, 550
Illinois	50	8, 518	149, 288	7, 845	169, 288	605	797	56, 264
Indiana	22	3, 807	31, 055	3, 030	35, 116	557	779	33, 297
Iowa	----------	----------	----------	----------	----------	----------	----------	60
Kansas	----------	----------	----------	----------	----------	----------	----------	100
Kentucky	165	39, 726	597, 707	30, 781	455, 428	3, 938	1, 732	9, 953
Louisiana	171	99, 185	4, 092, 898	84, 502	2, 574, 992	9, 741	2, 045	175, 158
Maine	13	4, 352	49, 564	3, 588	41, 060	998	----------	100
Maryland	----------	----------	----------	----------	----------	----------	----------	----------
Massachusetts	----------	----------	----------	----------	----------	----------	----------	----------
Michigan	459	170, 841	1, 433, 313	147, 248	1, 019, 764	7, 297	7, 035	690, 978
Minnesota	503	164, 219	774, 760	136, 217	760, 537	10, 116	12, 094	256, 028
Mississippi	785	159, 481	4, 123, 919	163, 335	4, 179, 884	6, 109	7, 381	281, 718
Missouri	396	55, 274	910, 792	54, 386	767, 629	21, 088	3, 827	28, 513
Montana	1, 866	1, 218, 917	14, 781, 222	731, 920	14, 359, 657	15, 421	14, 000	161, 538
Nebraska	2	4	35	5	20	8	80	34, 545
Nevada	48	238	1, 273	494	2, 441	165	41	1, 228
New Hampshire	65	28, 725	321, 339	30, 582	338, 346	5, 058	1, 277	2, 466
New Jersey	----------	----------	----------	----------	----------	----------	----------	----------
New Mexico	1, 424	152, 696	1, 774, 631	155, 575	1, 943, 979	10, 258	----------	25, 386
New York	1	8	172	8	172	55	----------	42
North Carolina	506	55, 140	899, 033	73, 449	1, 485, 292	2, 847	4, 758	56, 713
North Dakota	8	22	208	24	211	----------	----------	967
Ohio	38	4, 880	56, 698	4, 994	46, 658	334	835	28, 063
Oklahoma	43	13, 063	357, 629	7, 882	251, 871	3, 133	279	14, 196
Oregon	3, 717	3, 894, 887	131, 241, 031	3, 223, 266	122, 605, 709	67, 023	49, 576	679, 502
Pennsylvania	59	37, 406	1, 026, 512	37, 144	1, 474, 112	2, 752	----------	19, 900
Rhode Island	----------	----------	----------	----------	----------	----------	----------	----------
South Carolina	221	134, 521	3, 356, 523	104, 944	3, 173, 034	2, 102	4, 986	56, 324
South Dakota	105	93, 399	945, 356	65, 140	566, 686	3, 051	430	47, 684
Tennessee	284	35, 538	445, 169	39, 512	533, 352	1, 419	911	19, 123
Texas	215	78, 494	2, 855, 446	65, 069	2, 444, 245	1, 505	5, 221	80, 682
Utah	905	99, 017	797, 873	54, 257	375, 804	4, 485	1, 445	21, 225
Vermont	29	13, 221	365, 816	10, 983	530, 711	4, 513	----------	1, 445
Virginia	237	54, 846	458, 346	66, 281	566, 645	1, 533	1, 364	19, 935
Washington	1, 795	1, 599, 732	44, 795, 867	1, 650, 690	58, 058, 009	16, 872	24, 900	401, 078
West Virginia	134	44, 386	980, 701	55, 459	1, 048, 143	3, 647	519	24, 437
Wisconsin	323	107, 794	923, 930	85, 500	721, 946	3, 836	4, 510	280, 266
Wyoming	505	141, 297	789, 549	117, 259	904, 306	1, 745	3, 715	25, 386
Total	26, 610	13, 382, 026	317, 302, 594	11, 526, 725	307, 609, 817	303, 661	261, 172	4, 867, 211

Volume and value of timber cut and sold in National Forests; timber stand improvement, and area planted and seeded to trees, fiscal year 1971

State	Timber sold			Timber harvested		Acres planted and seeded to trees		
	Sales	Volume	Value	Volume	Value	Timber stand improvement, fiscal year 1971	Fiscal year 1971	Accumulative total planted and seeded, June 30, 1971
	Number	*M.Bd.Ft.*	*Dollars*	*M.Bd.Ft.*	*Dollars*	*Acres*	*Acres*	*Acres*
Alabama	330	60, 193	$1, 406, 404	49, 944	$1, 633, 662	4, 026	12, 400	137, 649
Alaska	43	215, 306	2, 193, 004	586, 073	4, 884, 106	----------	11	5, 096
Arizona	1, 012	169, 691	2, 584, 465	267, 800	4, 425, 369	37, 384	2, 126	19, 516
Arkansas	715	163, 087	4, 108, 669	134, 655	3, 884, 592	9, 855	12, 884	115, 725
California	3, 814	1, 800, 391	42, 719, 320	1, 843, 272	49, 582, 407	35, 875	25, 957	373, 665
Colorado	942	154, 546	440, 575	189, 835	1, 908, 954	4, 293	6, 280	139, 004
Florida	188	94, 286	2, 688, 765	74, 875	2, 002, 148	1, 446	15, 033	133, 942
Georgia	391	60, 449	1, 831, 290	66, 726	1, 992, 159	1, 558	3, 228	65, 683
Idaho	1, 992	826, 061	6, 961, 666	800, 566	12, 380, 709	9, 700	33, 094	353, 644
Iowa	----------	----------	----------	----------	----------	----------	----------	60
Illinois	65	6, 964	109, 090	9, 337	149, 857	714	1, 313	57, 577
Indiana	24	2, 664	32, 646	2, 616	31, 829	654	916	34, 213
Kansas	----------	----------	----------	----------	----------	----------	----------	100
Kentucky	160	30, 608	411, 494	25, 629	417, 096	4, 918	2, 933	12, 886
Louisiana	213	124, 247	4, 614, 733	87, 157	2, 879, 550	7, 686	2, 621	177, 779
Maine	7	4, 984	54, 561	6, 155	62, 779	292	18	118
Michigan	383	143, 824	1, 131, 524	125, 890	881, 132	6, 068	5, 785	696, 763
Minnesota	361	83, 153	560, 444	136, 899	686, 168	5, 360	16, 600	272, 628
Mississippi	646	165, 118	5, 632, 312	153, 137	4, 968, 940	6, 594	12, 208	293, 926
Missouri	432	49, 034	647, 319	55, 128	864, 766	21, 202	4, 245	132, 758
Montana	1, 697	599, 542	7, 464, 081	683, 540	11, 721, 075	24, 675	19, 681	181, 219
Nebraska	----------	----------	----------	2	30	10	100	34, 645
Nevada	61	480	2, 733	412	2, 092	499	91	1, 319
New Hampshire	53	29, 632	462, 482	27, 409	289, 822	3, 545	2	2, 468
New Mexico	1, 411	164, 951	1, 754, 930	126, 086	1, 751, 879	12, 456	1, 023	26, 409
New York	----------	----------	----------	----------	----------	55	----------	42
North Carolina	366	57, 237	969, 226	63, 503	1, 182, 360	3, 108	4, 196	60, 909
North Dakota	4	12	120	15	150	----------	----------	967
Ohio	50	5, 826	82, 287	5, 328	57, 779	210	780	28, 843
Oklahoma	45	25, 910	479, 464	10, 501	266, 099	1, 501	867	15, 063
Oregon	3, 698	3, 576, 327	85, 184, 973	2, 874, 288	99, 293, 941	56, 763	36, 434	715, 936
Pennsylvania	65	42, 199	1, 025, 716	38, 631	1, 519, 555	867	----------	19, 900
South Carolina	221	121, 691	2, 763, 036	116, 781	3, 149, 588	4, 371	7, 074	63, 398
South Dakota	84	47, 443	219, 729	72, 898	644, 959	2, 843	150	47, 834
Tennessee	239	46, 960	621, 205	36, 449	525, 718	1, 494	844	19, 967
Texas	217	92, 745	3, 427, 685	82, 055	3, 245, 262	786	7, 698	88, 380
Utah	802	82, 108	397, 508	48, 718	278, 976	4, 858	1, 560	22, 785
Vermont	21	11, 620	370, 287	13, 904	571, 610	3, 200	----------	1, 445
Virginia	247	47, 511	382, 717	69, 670	640, 420	2, 192	1, 804	21, 739
Washington	1, 411	1, 298, 408	29, 837, 763	1, 219, 491	36, 009, 148	15, 300	20, 662	421, 740
West Virginia	124	31, 740	484, 504	42, 758	883, 531	2, 434	541	24, 978
Wisconsin	276	102, 386	828, 618	. 81, 662	613, 942	3, 506	3, 794	284, 060
Wyoming	433	97, 053	412, 207	111, 409	736, 026	1, 020	2, 076	27, 462
Total	23, 243	10, 636, 387	215, 299, 552	10, 341, 204	257, 020, 185	303, 318	267, 029	5, 134, 240

In fiscal years 1970 and 1971 the Forest Service continued its program to improve the timber quality and productivity with the following major reforestation and timber stand improvement (TSI) accomplishments

FOREST SERVICE TIMBER STAND IMPROVEMENT

[In acres]

Type of work	Financed from—							
	Forest land management appropriation		Deposits by timber purchasers		Antipoverty and other programs		Total	
	1970	1971	1970	1971	1970	1971	1970	1971
Planted	73, 596	87, 964	133, 295	127, 790	1, 493	1, 741	208, 384	217, 495
Seeded	17, 825	23, 495	34, 808	25, 511	156	78	52, 789	49, 534
Natural regeneration on prepared sites	10, 424	9, 205	37, 067	27, 366	4, 567	4, 145	52, 058	40, 716
Total reforestation	101, 845	121, 114	205, 170	180, 667	6, 216	5, 964	313, 231	307, 745
Release	64, 452	51, 153	68, 129	64, 323	5, 896	4, 327	138, 477	119, 803
Thinning	58, 483	64, 109	100, 050	115, 957	3, 882	1, 562	162, 415	181, 628
Pruning	504	579	2, 094	1, 156	171	152	2, 769	1, 887
Total timber stand improvement	123, 439	115, 841	170, 273	181, 436	9, 949	6, 041	303, 661	303, 318

Construction, reconstruction and maintenance of National Forest (forest development) roads, bridges and trails, fiscal year 1970

State	Roads				Trails			Total obligations from all U.S. funds
	Construction and reconstruction	Construction and reconstruction by timber purchasers		Existing	Bridges	Construction and reconstruction	Existing	
	Miles	*Miles*	*Dollars*	*Miles*		*Miles*	*Miles*	*Dollars*
Alabama		0. 7	11, 685. 00	761. 4				623, 154. 60
Alaska	2. 0	14. 0	338, 000. 00	404. 2	1	10. 0	499. 6	1, 641, 161. 13
Arizona	32. 3	92. 3	453, 983. 00	10, 461. 1	4	16. 0	3, 479. 1	3, 096, 370. 25
Arkansas	24. 4	14. 0	53, 150. 00	2, 671. 2	2		7. 9	2, 950, 020. 06
California	80. 9	1, 739. 8	22, 029, 573. 00	37, 708. 5	11	21. 6	14, 795. 5	41, 227, 118. 53
Colorado	120. 5	71. 5	577, 593. 00	12, 727. 5	7	66. 6	9, 753. 2	6, 391, 831. 57
Florida				1, 153. 4	1		213. 7	667, 883. 67
Georgia	3. 1			1, 407. 1	1	7. 7	254. 6	728, 139. 09
Idaho	68. 1	643. 3	6, 710, 490. 00	18, 637. 5	27	27. 7	18, 192. 9	13, 543, 582. 22
Illinois				421. 8	2		57. 9	226, 142. 50
Indiana				1, 107. 4				114, 877. 33
Kansas				68. 2				810. 72
Kentucky		6. 6		1, 020. 8			139. 6	686, 351. 81
Louisiana	6. 2	21. 7	88, 931. 00	1, 048. 5	5			651, 760. 95
Maine				61. 1			82. 0	41, 595. 60
Michigan	13. 8	11. 3	77, 300. 00	3, 165. 7	3		192. 7	1, 713, 905. 66
Minnesota	27. 7			2, 889. 4	4		620. 4	1, 892, 909. 63
Mississippi	3. 2	1. 5	4, 533. 00	1, 044. 2	21	23. 1	48. 1	969, 679. 79
Missouri	11. 4	9. 4	5, 000. 00	1, 142. 0			86. 0	696, 372. 00
Montana	95. 5	1, 511. 7	4, 073, 015. 00	16, 138. 0	29	43. 8	14, 188. 6	9, 946, 361. 93
Nebraska	1. 0			449. 9			21. 0	67, 028. 98
Nevada	20. 7			3, 266. 4		1. 0	1, 750. 2	754, 311. 95
New Hampshire	4. 1	2. 1	18, 900. 00	312. 9			1, 046. 4	483, 714. 12
New Mexico	36. 4	32. 2	290, 440. 00	7, 458. 0	2		3, 308. 9	3, 682, 899. 66
New York				11. 2			14. 2	3, 908. 76
North Carolina	20. 4			1, 105. 8			1, 196. 9	2, 864, 527. 63
North Dakota	2. 0			1, 399. 6				179, 039. 63
Ohio	4. 8			311. 7				312, 227. 20
Oklahoma	2. 2			219. 7	1		21. 4	117, 445. 01
Oregon	163. 0	1, 456. 5	23, 157, 124. 26	31, 556. 8	8	9. 8	7, 273. 4	37, 450, 170. 52

Construction, reconstruction and maintenance of National Forest (forest development) roads, bridges and trails, fiscal year 1970—Continued

State and Commonwealth	Roads				Bridges	Trails		Total obligations from all U.S. funds
	Construction and reconstruction	Construction and reconstruction by timber purchasers		Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Dollars*	*Miles*		*Miles*	*Miles*	*Dollars*
Pennsylvania	6. 2	15. 9	177, 800. 00	766. 0	1		124. 0	1, 115, 031. 06
Puerto Rico	2. 3			2. 9			38. 9	22, 759. 90
South Carolina	12. 8	27. 4	137, 891. 00	978. 5	2		62. 0	743, 363. 75
South Dakota	13. 9	14. 5	124, 453. 00	2, 882. 1			29. 5	1, 118, 389. 31
Tennessee	6. 5			755. 3	1		568. 4	762, 461. 56
Texas		17. 5	274, 071. 00	770. 2	3	5. 0		439, 388. 22
Utah	23. 9	2. 1	20, 491. 00	7, 082. 7	1		5, 932. 5	3, 006, 618. 63
Vermont	4. 3	3. 1	23, 200. 00	161. 9			220. 8	559, 343. 34
Virginia	6. 2			1, 283. 1	2	7. 4	1, 249. 6	1, 745, 846. 16
Washington	78. 8	669. 7	11, 063, 051. 91	12, 726. 8	7	14. 3	6, 922. 4	13, 325, 318. 57
West Virginia	14. 4	6. 9	44, 200. 00	1, 634. 1			789. 0	2, 270, 541. 73
Wisconsin	11. 6			2, 253. 7	1	15. 0	321. 9	1, 372, 683. 15
Wyoming	17. 5	43. 5	325, 864. 00	5, 136. 2	7	9. 1	6, 249. 0	2, 517, 347. 68
Washington, D.C. Office								3, 070, 726. 44
Total	942. 1	6, 429. 2	70, 080, 738. 17	196, 564. 5	154	278. 1	99, 745. 2	165, 795, 122. 00

Construction, reconstruction, and maintenance of National Forest (forest development) roads, bridges, and trails, fiscal year 1971

State and Commonwealth	Roads				Bridges	Trails		Total obligation, appropriated funds
	Construction and reconstruction	Timber purchaser		Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Dollars*	*Miles*	*Number*	*Miles*	*Miles*	*Dollars*
Alabama		3. 9	42. 3	760. 0				660. 3
Alaska	6. 0	22. 0	1, 520. 0	432. 9		28. 0	545. 4	5, 009. 3
Arizona	3. 6	69. 2	629. 5	10, 302. 1		4. 5	3, 470. 0	3, 109. 1
Arkansas	9. 0	13. 0	71. 3	2, 600. 0			8. 0	165. 7
California	229. 0	369. 07	28, 545. 0	38, 118. 0		19. 6	20, 522. 7	32, 483. 9
Colorado	3. 0			12, 700. 0			9, 750. 0	. 9
Florida	7. 6	6. 4	27. 2	1, 153. 0		30. 0		842. 5
Georgia	6. 3	. 8	37. 1	1, 400. 0				688. 8
Idaho	105. 8	877. 7	9, 548. 9	19, 258. 7		25. 0	18, 320. 0	17, 110. 6
Illinois	. 2			422. 8			57. 9	278. 9
Indiana	1. 0			1, 113. 5				394. 8
Kansas				1, 107. 4				(1)
Kentucky	8. 6	1. 1	6. 0	1, 020. 0			139. 0	777. 4
Louisiana	33. 2	5. 7	250. 9	1, 040. 0				755. 7
Maine	2. 6			61. 1			82. 0	173. 8
Michigan	31. 3			3, 171. 5			192. 7	2, 845. 0
Minnesota	24. 8			2, 875. 6			621. 3	2, 636. 2
Mississippi	. 6	29. 3	627. 8	1, 040. 0			48. 0	808. 4
Missouri	11. 0			1, 145. 1			86. 0	625. 9
Montana	82. 3	551. 5	4, 363. 0	16, 676. 7		7. 7	14, 241. 3	12, 928. 9
Nebraska				450. 0			21. 0	(1)
Nevada	11. 1			3, 321. 9		4. 2	1, 757. 5	1, 012. 8
New Hampshire	2. 8	. 4	4. 1	318. 1			1, 063. 2	508. 0
New Mexico	62. 3	20. 9	187. 1	7, 042. 8			3, 158. 2	5, 626. 6
New York	. 4			11. 2		12. 5	14. 2	26. 8
North Carolina	6. 5	12. 0	62. 6	1, 105. 0			1, 190. 0	1, 032. 4
North Dakota				1, 401. 1				(1)
Ohio	2. 2			313. 7				207. 3
Oklahoma				4. 5			21. 0	173. 2
Oregon	60. 2	2, 486. 6	41, 014. 1	31, 948. 0		67. 5	7, 155. 3	33, 970. 1
Pennsylvania	1. 0			778. 6		7. 0	124. 0	944. 6
Puerto Rico				2. 9			38. 0	(1)
South Carolina	4. 3	3. 3	246. 6	978. 0		10. 0	62. 0	577. 9
South Dakota	(1)	(1)	(1)	2, 882. 0			29. 0	(1)
Tennessee	2. 0			755. 0			561. 0	719. 2
Texas	4. 9	11. 2	460. 3	13. 0				530. 6
Utah	5. 1	32. 1	174. 9	7, 438. 9		18. 7	5, 988. 6	4, 936. 1
Vermont	4. 3	2. 7	40. 0	160. 0			232. 0	584. 4
Virginia	4. 9	7. 5	64. 9	1, 280. 0		6. 0	1, 250. 0	3, 972. 0
Washington	47. 5	672. 1	12, 402. 0	13, 033. 5		40. 1	5, 992. 3	12, 108. 3
West Virginia	. 4			644. 8			671. 8	1, 020. 6
Wisconsin	11. 5	2. 2	13. 0	2, 290. 8		2. 0	324. 0	1, 205. 4
Wyoming	4. 3	24. 0	188. 8	1, 726. 4		3. 5	3, 181. 7	1, 196. 2
Total	801. 6	8, 546. 3	100, 527. 4	194, 298. 6		286. 3	100, 919. 1	152, 648. 6

[1] Not available.

Forest Service reforestation and stand improvement on the National Forest System

Year	Planted and seeded	Natural regeneration on prepared sites	Total reforested	Stand improvement
1971	267, 029	40, 716	307, 745	303, 318
1970	261, 173	52, 058	313, 231	303, 661
1969	256, 545	43, 868	300, 413	321, 248
1968	268, 878	52, 386	321, 264	364, 325
1967	256, 926	33, 717	290, 643	422, 885
1966	236, 840	51, 091	287, 931	425, 634
Total	1, 547, 391	273, 836	1, 821, 227	2, 141, 071

NOTE.—The gradual decline in TSI reflects a long-term trend toward more costly thinning in place of less costly release.

Forest Service harvesting the allowable annual cut on the National Forest System

[Volumes in billions of board feet]

Fiscal year	Annual allowable cut [1]	Actual volume cut	Percent of allowable cut harvested	Actual volume sold	Percent of allowable cut sold
1966	12. 4	12. 1	97	11. 4	91
1967	12. 2	10. 9	89	11. 7	95
1968	12. 2	12. 1	99	11. 7	95
1969	12. 8	11. 8	92	[2] 18. 9	[2] 148
1970	12. 9	11. 5	89	13. 4	104
1971	12. 9	10. 3	80	10. 6	82

[1] Annual allowable cuts include only sawtimber for National Forests west of the Great Plains and in Alaska, and sawtimber and convertible products for National Forests in the Eastern half of the United States.
[2] Actual volume sold includes Juneau unit pulp sale in Alaska of 8.8 billion board feet to be cut over a 50-year period.

Works of improvement installed in watershed projects (Pilot and Public Law 566 watersheds), fiscal years 1970 and 1971

FOREST SERVICE, USDA

Item	Unit	Installed in—		Estimated total practices on land as of—	
		1970	1971	June 30, 1970 [1]	June 30, 1971 [2]
Measures:					
Channel improvement	Miles	1. 5	0. 0	1. 5	1. 5
Channel stabilization	do	. 3	2. 3	4. 0	6. 3
Contour terraces and furrows	do	33. 0	24. 4	125. 0	149. 4
Area treated	Acres	1, 309. 0	975. 0	8, 639. 0	9, 614. 0
Gully control and stabilization	Miles	15. 0	24. 0	96. 0	120. 0
Grade stabilization structures	Number	53	48	1, 053	1, 101
Forest stand improvement	Acres	211, 538. 0	13, 747. 0	1, 021, 929. 0	1, 035, 676. 0
Forest watershed management planning:					
Plans prepared	Number	806	942	6, 111	7, 053
Area involved	Acres	57, 405. 0	57, 396. 0	1, 006, 646. 0	1, 964, 042. 0
Fire control—Roads, trails firebreaks and fuelbreaks.	Miles	175. 0	92. 0	898. 0	990. 0
Fire control—Water developments	Number	4	2	27	29
Fire towers	do	0	0	8	8
Intensified fire protection	Acres	483, 514. 0	730, 013. 0	1, 121, 723. 0	1, 851, 736. 0
Heliports and helispots	Number	0	0	17	17
Mobile fire equipment	do	6	0	53	53
Other fire control improvements	do	0	432	17	449
Radio installations	do	1	0	48	48
Proper harvest cutting	Acres	55, 660. 0	46, 398. 0	267, 966. 0	314, 364. 0
Range and grass seeding	do	1, 637. 0	2, 951. 0	32, 873. 0	35, 824. 0
Forest road and roadbank stabilization	Miles	40. 0	553. 0	369. 0	922. 0
Area treated	Acres	27. 0	1, 356. 0	1, 267. 0	2, 623. 0
Tree planting and seeding	do	11, 253. 0	23, 526. 0	168, 947. 0	192, 473. 0
Critical area stabilization by tree planting and other measures.	do	910. 0	2, 152. 0	31, 391. 0	33, 473. 0
Revegetation, surface mined areas	do	593. 0	626. 0	619. 0	1, 245. 0
Recreation area development	do	21. 0	975. 0	121. 0	1, 096. 0
Wildlife habitat development	do	355. 0	1, 236. 0	5, 608. 0	6, 844. 0
Wildlife ponds	Number	0	0	27	27
Woodland grazing control	Acres	7, 287. 0	16, 403. 0	242, 148. 0	258, 551. 0
Woodland thinning and release	do	45, 866. 0	156, 065. 0	389, 704. 0	545, 769. 0

[1] Accomplishment under all programs. Total include unreported practices installed prior to 1970 and also are adjusted for losses, i.e., burned plantations, etc.
[2] (Same as footnote 1 above except year—"prior to 1971".)

Works of improvement installed in flood prevention projects, fiscal years 1970 and 1971

FOREST SERVICE, USDA

Item	Unit	Installed (all funds) in—		Estimated total practices on land as of—	
		1970	1971	June 30, 1970 [1]	June 30, 1971 [2]
Structural measures:					
Access road construction	Miles			42. 7	42. 7
Channel improvement	do			11. 6	11. 6
Channel stabilization	do	8. 7	1. 2	55. 4	56. 6
Diversion ditches	Linear feet	1, 000. 0		4, 558. 0	4, 558. 0
Floodwater retarding structures	Number	0. 0		1. 0	1. 0
Grade stabilization structures	do	7. 0	33. 0	494. 0	527. 0
Streambank stabilization	Miles	1. 0	3. 6	6. 3	9. 9
Land treatment measures:					
Forest stand improvement	Acres	36, 129. 0	6, 347	638, 219. 0	644, 566. 0
Forest watershed management planning:					
Plans prepared	Number	1, 570	1, 156	10, 806. 0	11, 962. 0
Area involved	Acres	148, 411. 0	126, 348. 0	956, 911. 0	1, 083, 259. 0
Fire control—Firebreaks and fuelbreaks	Miles	93. 0	39. 0	2, 766. 0	2, 805. 0
Fire control—Roads and trails	do	14. 0	29. 0	248. 0	277. 0
Fire control—Hazard reduction	Acres		332. 0	460. 0	792. 0
Fire control—Water developments	Number	7. 0	5. 0	150. 0	155. 0
Fire towers	do	0		46. 0	46. 0
Heliports and helispots	do	6. 0	6. 0	438. 0	444. 0
Mobile equipment (fire)	do	2. 0	1. 0	115. 0	116. 0
Other fire control improvements	do	2. 0	4. 0	171. 0	175. 0
Permanent radio installations	do	4. 0		311. 0	311. 0
Proper harvest cutting	Acres	8, 459. 0	12, 332. 0	274, 080. 0	286, 412. 0
Forest road and roadbank stabilization	Miles	49. 0	156. 0	1, 266. 0	1, 422. 0
Area treated	Acres	716. 0	2, 548. 0	12, 406. 0	14, 954. 0
Tree planting and seeding	do	4, 962. 0	9, 079. 0	394, 671. 0	403, 750. 0
Critical area stabilization by tree planting and other measures.	do	18, 950. 0	14, 271. 0	261, 838. 0	276, 109. 0
Revegetation, surface mined areas	do	625. 0	455. 0	3, 778. 0	4, 233. 0
Woodland grazing control	do	1, 464. 0	1, 553. 0	171, 143. 0	172, 696. 0
Woodland thinning and release	do	3, 565. 0	32, 724. 0	351, 710. 0	384, 434. 0
Woodland owners assisted	Number	6, 000. 0	3, 115. 0	39, 761. 0	42, 876. 0

[1] Total include unreported practices installed prior to 1970, adjusted for losses, i.e. burned plantations, etc.
[2] Total include unreported practices installed prior to 1971, adjusted for losses, i.e. burned plantations, etc.

Kind of progress	Forest Service Region or Area			
	Region 1	Region 2	Region 3	Region 4
FORESTERS' ACCOMPLISHMENTS				
1. Woodland owners assisted:				
(*a*) New cases—number	741	3, 414	162	347
(*b*) Repeat cases—do	835	1, 206	187	112
(*c*) Area involved—acres	76, 804	133, 959	184, 467	18, 960
2. Management plans:				
(*a*) Brief—number	169	443	42	3
(*b*) Detailed—do	17	316	5	4
(*c*) Area involved—acres	14, 715	96, 936	66, 718	13, 445
3. Timber marked:				
(*a*) Commercial harvest—do	1, 533	8, 133	397	70
(*b*) Noncommercial—do	101	525	119	104
(*c*) Sawtimber, veneer, poles, piling, and ties—MBF	6, 637	6, 837	----------	120
(*d*) Small wood products—cords	135	8, 416	75	----------
4. Other assists given woodland owners:				
(*a*) Grazing—number	150	249	73	----------
(*b*) Recreation—do	9	509	24	12
(*c*) Special forest products—do	340	1, 764	95	38
(*d*) Water—do	14	236	44	2
(*e*) Wildlife—do	24	257	62	4
5. Information given:				
(*a*) Programs, demostrations, and tours—do	281	710	33	39
(*b*) Radio, TV, and exhibits—do	20	365	7	31
(*c*) News releases and articles—do	57	523	2	38
6. Forest products operators assisted—do	138	559	41	31
7. Forest industry development assists—do	59	193	4	1
8. Referrals to consulting and industrial foresters—do	31	24	4	4
9. Products harvested with marketing assistance only—dollars	108, 250	111, 314	11, 000	2, 395
WOODLAND OWNERS' ACCOMPLISHMENTS AND RETURNS UNDER IMPROVED MANAGEMENT				
14. Area of timber stand inprovement—acres	2, 712	1, 484	572	12
15. Area planted or seeded—do	307	1, 266	222	80
16. Area managed for special forest products—do	11, 997	3, 828	585	43
17. Area managed for commercial recreation use—do	----------	3, 901	2, 800	----------
18. Area placed under protection from:				
(*a*) Fire—do	19, 372	283, 172	182	30
(*b*) Grazing—do	9, 212	2, 393	276	32
(*c*) Pests—do	266	7, 701	499	268
(*d*) Erosion—do	303	1, 875	20, 177	718
19. Products harvested for industry:				
(*a*) Area of timber harvested—do	4, 516	3, 708	2, 160	10
(*b*) Sawtimber, veneer, poles, piling and ties—MBF	7, 205	5, 024	10, 108	----------
(*c*) Small wood products—cords	1, 131	3, 638	2, 195	----------
(*d*) Special forest products—dollars	79, 901	27, 017	4, 000	7, 935
20. Gross returns—do	263, 584	237, 402	86, 527	7, 935
21.	----------	271	----------	----------
22.	----------	85	----------	----------
PROJECT STATUS				
23. Service foresters on project—number	14	31	5	8
24. Requests received—do	1, 854	5, 869	381	489
25. Requests not yet acted upon—do	82	362	----------	----------

FORESTERS COOPERATING

Forest Service Region or Area—Continued					Total United States	ITF	Grand total
Region 5	Region 6	Region 10	Northeastern Area	Southeastern Area			
1, 360	1, 655	2	26, 277	25, 786	59, 744	500	60, 244
1, 116	2, 580	2	26, 837	20, 463	53, 338	1, 615	54, 953
221, 929	238, 965	392	1, 502, 037	4, 566, 914	6, 943, 212	1, 029	6, 945, 456
95	226	----------	8, 330	14, 926	24, 234	329	24, 563
4	65	----------	1, 515	802	2, 728	172	2, 900
53, 773	21, 194	----------	525, 971	1, 853, 002	2, 645, 754	466	2, 646, 200
4, 606	12, 507	6	115, 673	143, 380	286, 305	85	286, 390
136	5, 525	34	31, 030	1, 142	38, 716	47	38, 763
14, 928	54, 229	100	178, 359	595, 179	856, 389	9	856, 398
358	6, 789	----------	151, 697	547, 249	714, 719	514	715, 233
133	194	----------	1, 911	597	3, 307	965	4, 272
99	52	1	----------	341	1, 047	45	1, 092
973	903	----------	1, 763	578	6, 454	154	6, 608
29	71	----------	912	126	1, 434	58	1, 492
47	27	----------	2, 011	456	2, 888	5	2, 893
207	831	43	4, 425	4, 436	11, 005	9	11, 014
77	80	9	1, 717	9, 319	11, 625	1	11, 626
134	256	2	2, 322	5, 424	8, 758	1	8, 759
124	145	192	8, 567	3, 794	13, 591	29	13, 620
28	26	28	578	270	1, 187	----------	1, 187
203	47	4	----------	1, 793	2, 110	----------	2, 110
368, 980	815, 793	----------	----------	2, 338, 977	3, 756, 709	4, 560	3, 761, 269
2, 390	8, 638	----------	46, 313	73, 508	135, 629	83	135, 712
8, 201	5, 161	----------	51, 354	83, 346	149, 937	505	150, 442
3, 455	8, 384	----------	7, 918	116, 298	152, 508	32	152, 540
4, 000	75	----------	9, 802	39, 387	59, 965	26	59, 991
2, 426	3, 484	----------	46, 690	311, 888	667, 244	113	667, 357
7, 122	209	----------	55, 971	8, 373	83, 588	299	83, 887
1, 037	2, 781	----------	7, 413	82, 439	102, 404	30	102, 434
1, 796	183	----------	6, 108	3, 256	34, 416	220	34, 636
13, 376	9, 296	----------	106, 131	121, 506	260, 703	32	260, 735
36, 594	57, 677	----------	167, 240	625, 484	909, 332	4	909, 336
4, 497	2, 673	----------	112, 879	515, 353	642, 366	20	642, 386
1, 329, 669	1, 498, 058	----------	1, 683, 125	2, 593, 671	7, 223, 376	1, 325	7, 224, 701
1, 953, 689	3, 702, 437	----------	7, 618, 148	18, 006, 873	31, 876, 595	4, 225	31, 880, 820
----------	----------	----------	----------	60, 549	60, 820	----------	60, 820
----------	----------	----------	----------	30, 600	30, 685	----------	30, 685
11	24	8	412	317	830	7	837
3, 069	4, 449	----------	61, 903	50, 866	128, 880	2, 415	131, 295
92	122	----------	11, 452	3, 406	15, 516	260	15, 776

Kind of progress	Forest Service Region or Area			
	Region 1	Region 2	Region 3	Region 4
FORESTERS' ACCOMPLISHMENTS				
1. Woodland owners assisted:				
(*a*) New cases—number	917	4, 011	66	472
(*b*) Repeat cases—do	1, 264	1, 522	99	224
(*c*) Area involved—acres	108, 401	164, 658	74, 310	19, 740
2. Management plans:				
(*a*) Brief—number	342	480	4	54
(*b*) Detailed—do	14	177	----------	5
(*c*) Area involved—acres	24, 474	36, 807	4, 120	5, 805
3. Timber marked:				
(*a*) Commercial harvest—do	1, 120	5, 496	354	677
(*b*) Noncommercial—do	126	706	47	390
(*c*) Sawtimber, veneer, poles, piling, and ties—MBF	4, 829	4, 086	2, 406	959
(*d*) Small wood products—cords	247	10, 266	2	15
4. Other assists given woodland owners:				
(*a*) Grazing—number	326	285	198	2
(*b*) Recreation—do	34	424	17	7
(*c*) Special forest products—do	406	1, 459	38	61
(*d*) Water—do	28	310	5	1
(*e*) Wildlife—do	51	365	16	1
5. Information given:				
(*a*) Programs, demonstrations, and tours—do	265	817	20	56
(*b*) Radio, TV, and exhibits—do	29	500	6	39
(*c*) News releases and articles—do	180	446	38	69
6. Forest products operators assisted—do	171	579	23	103
7. Forest industry development assists—do	35	197	9	15
8. Referrals to consulting and industrial foresters—do	23	37	10	1
9. Products harvested with marketing assistance only—dollars	88, 921	75, 328	1, 050	15, 123
WOODLAND OWNERS' ACCOMPLISHMENTS AND RETURNS UNDER IMPROVED MANAGEMENT				
14. Area of timber stand improvement—acres	4, 422	1, 602	276	525
15. Area planted or seeded—do	761	2, 208	510	173
16. Area managed for special forest products—do	5, 664	3, 113	281	1, 068
17. Area managed for commercial recreation use—do	160	1, 260	7, 200	----------
18. Area placed under protection from—				
(*a*) Fire—do	1, 541, 298	350, 027	1, 014	733
(*b*) Grazing—do	23, 609	1, 580	280	13
(*c*) Pests—do	7, 803	26, 421	254	92
(*d*) Erosion—do	7, 893	1, 729	2, 108	146
19. Products harvested for industry:				
(*a*) Area of timber harvested—do	3, 408	2, 762	1, 416	1, 100
(*b*) Sawtimber, veneer, poles, piling, and ties—MBF	13, 191	4, 596	6, 069	1, 000
(*c*) Small wood products—cords	901	2, 782	50	5, 600
(*d*) Special forest products—dollars	208, 670	45, 163	9, 670	12, 120
20. Gross returns—do	464, 663	193, 253	57, 531	25, 670
PROJECT STATUS				
23. Service foresters on project—number	16	34	6	8
24. Requests received—do	2, 796	7, 136	185	815
25. Requests not yet acted upon—do	116	412	10	----------

FORESTERS COOPERATING

Forest Service Region or Area—Continued					Total United States	ITF	Grand total
Region 5	Region 6	Region 10	Northeastern Area	Southeastern Area			
1, 702	1, 733	6	29, 214	30, 933	69, 054	678	69, 732
1, 242	2, 732	1	27, 582	21, 785	56, 451	1, 645	58, 096
415, 535	272, 670	580	1, 570, 768	5, 308, 873	7, 935, 535	1, 060	7, 936, 595
129	225	----------	9, 150	15, 984	26, 323	87	26, 410
15	49	----------	2, 048	1, 225	3, 533	17	3, 550
47, 521	28, 312	----------	562, 528	1, 673, 182	2, 382, 749	212	2, 382, 961
4, 952	13, 292	----------	107, 416	149, 637	282, 944	19	282, 963
2, 362	4, 071	----------	28, 506	752	36, 960	66	37, 026
28, 724	26, 225	----------	182, 702	389, 784	639, 715	----------	639, 715
75, 395	6, 096	----------	133, 468	576, 454	801, 943	42	801, 985
153	161	----------	2, 496	1, 475	5, 096	93	5, 189
230	49	2	7, 928	323	9, 014	16	9, 030
398	849	54	2, 139	796	6, 200	3	6, 203
81	118	----------	1, 159	343	2, 045	55	2, 100
121	43	----------	2, 511	601	3, 709	5	3, 714
207	810	55	5, 069	6, 607	13, 906	6	13, 912
73	76	8	1, 799	6, 869	9, 399	1	9, 400
105	188	1	2, 890	6, 614	10, 531	----------	10, 531
166	135	210	8, 722	4, 474	14, 583	44	14, 627
34	31	32	639	306	1, 298	----------	1, 298
159	64	2	1, 211	1, 617	3, 124	----------	3, 124
18, 200	60, 620	----------	1, 028, 880	1, 292, 038	2, 580, 160	2, 487	2, 582, 647
2, 799	7, 721	----------	49, 771	85, 281	152, 397	132	152, 529
5, 965	4, 692	18	55, 434	82, 031	151, 792	455	152, 247
5, 418	5, 606	----------	7, 717	153, 497	182, 364	----------	182, 364
6, 213	959	----------	8, 159	5, 069	29, 020	5	29, 02
9, 250	2, 855	----------	50, 269	326, 788	2, 282, 234	----------	2, 282, 234
703	427	----------	55, 223	13, 371	95, 206	455	95, 661
73, 442	772	----------	15, 336	47, 113	171, 233	----------	171, 233
1, 511	1, 100	----------	8, 872	3, 576	26, 935	115	27, 050
2, 841	9, 711	----------	81, 293	120, 939	223, 470	32	223, 502
26, 813	53, 500	----------	137, 922	336, 933	580, 024	----------	580, 024
4, 003	1, 017	----------	105, 303	442, 162	561, 818	14	561, 832
696, 130	842, 189	----------	2, 005, 766	4, 098, 165	7, 917, 873	1, 735	7, 919, 608
1, 447, 405	2, 224, 141	----------	6, 253, 060	16, 729, 737	27, 395, 460	2, 707	27, 398, 167
12	24	6	414	347	867	11	878
3, 467	4, 623	----------	67, 893	55, 027	141, 942	1, 026	142, 968
158	114	1	11, 189	3, 406	15, 406	60	15, 466

Forest service, Total C–M–2 area protected; number of fires and acres burned on State and private (C–M–2) protected area by States, calendar year 1970

State	Area protected	Number fires	Number acres burned
Alabama	20, 943	8, 156	139, 546
Alaska	16, 000	264	5, 655
Arizona	1, 629	101	2, 157
Arkansas	16, 535	4, 073	126, 134
California	19, 985	4, 320	202, 485
Colorado	9, 482	575	8, 430
Connecticut	1, 990	555	1, 322
Delaware	392	12	52
Florida	17, 637	5, 857	79, 822
Georgia	31, 066	13, 765	59, 328
Hawaii	1, 929	59	14, 245
Idaho	9, 901	777	8, 649
Illinois	3, 568	207	7, 542
Indiana	4, 012	371	4, 166
Iowa	2, 609	207	4, 437
Kansas	12, 552	976	34, 019
Kentucky	10, 953	2, 298	53, 008
Louisiana	12, 239	6, 429	80, 734
Maine	17, 321	430	971
Maryland	2, 855	513	1, 203
Massachusetts	3, 252	4, 879	6, 472
Michigan	17, 641	1, 393	6, 367
Minnesota	17, 653	876	25, 586
Mississippi	15, 661	6, 988	112, 282
Missouri	11, 140	2, 839	43, 829
Montana	7, 918	433	6, 404
Nebraska	7, 022	611	35, 673
Nevada	2, 216	195	1, 315
New Hampshire	4, 339	484	244
New Jersey	2, 108	1, 487	3, 477
New Mexico	37, 584	152	18, 741
New York	12, 621	631	2, 262
North Carolina	17, 820	4, 888	73, 078
North Dakota	228	7	137
Ohio	4, 005	1, 101	4, 901
Oklahoma	3, 819	1, 288	92, 941
Oregon	13, 099	1, 727	7, 025
Pennsylvania	16, 560	907	4, 508
Rhode Island	434	793	1, 102
South Carolina	12, 050	5, 655	63, 659

Forest service, Total C–M–2 area protected; number of fires and acres burned on State and private (C–M–2) protected area by States, calendar year 1970—Continued

State	Area protected	Number fires	Number acres burned
South Dakota	3, 960	476	6, 195
Tennessee	12, 686	3, 475	34, 198
Texas	10, 438	1, 519	19, 631
Utah	9, 006	223	3, 334
Vermont	4, 084	83	98
Virginia	14, 413	1, 810	10, 701
Washington	12, 509	2, 240	70, 238
West Virginia	10, 562	1, 208	30, 341
Wisconsin	15, 264	2, 729	10, 654
Wyoming	6, 811	413	11, 378
Total or average	520, 501	101, 455	1, 540, 676

State and Commonwealth	1970		
	Federal	State and county	Private
Alabama	488, 293	1, 106, 993	814,
Alaska	168, 331	2, 157, 109	
Arizona	54, 740	41, 245	14,
Arkansas	491, 173	1, 440, 620	53,
California	1, 153, 860	28, 249, 420	
Colorado	132, 152	702, 247	
Connecticut	125, 693	303, 825	
Delaware	14, 370	16, 181	
Florida	649, 258	6, 362, 131	
Georgia	682, 862	6, 219, 258	
Hawaii	62, 493	161, 272	
Idaho	260, 375	1, 010, 285	130,
Illinois	110, 700	391, 572	
Indiana	81, 934	213, 580	
Iowa	64, 474	70, 477	
Kansas	178, 689	551, 647	
Kentucky	336, 751	1, 327, 729	
Louisiana	544, 186	2, 792, 703	22,
Maine	451, 754	1, 633, 719	
Maryland	193, 361	956, 891	
Massachusetts	225, 129	463, 819	
Michigan	575, 303	2, 625, 374	
Minnesota	368, 172	615, 484	
Mississippi	545, 309	2, 320, 469	
Missouri	414, 283	1, 620, 016	

fire control dollar expenditures, fiscal year 1970–71

		1971			
	Total	Federal	State and county	Private	Total
441	2, 409, 727	473, 336	2, 232, 805	----------	2, 706, 141
----	2, 325, 440	163, 399	3, 803, 901	----------	3, 967, 300
874	110, 859	44, 470	32, 819	13, 967	91, 256
327	1, 985, 120	470, 660	1, 290, 832	327, 994	2, 089, 486
----	29, 403, 280	1, 118, 648	28, 883, 429	----------	30, 002, 077
----	834, 399	142, 929	1, 618, 530	----------	1, 761, 459
----	429, 518	122, 030	371, 671	----------	493, 701
----	30, 551	27, 661	89, 385	----------	117, 046
----	7, 011, 389	625, 568	6, 342, 223	----------	6, 967, 791
----	6, 902, 120	662, 026	6, 878, 753	----------	7, 540, 779
----	223, 765	56, 712	129, 226	----------	185, 938
875	1, 401, 535	313, 718	904, 020	173, 932	1, 391, 670
----	502, 272	108, 952	429, 825	----------	538, 777
----	295, 514	85, 972	275, 979	----------	361, 951
----	134, 951	62, 021	91, 532	----------	153, 553
----	730, 336	188, 559	567, 431	----------	755, 990
----	1, 664, 480	344, 012	1, 291, 693	----------	1, 635, 705
015	3, 358, 904	544, 372	3, 283, 337	17, 608	3, 845, 317
----	2, 085, 473	441, 332	1, 841, 519	----------	2, 282, 851
----	1, 150, 252	216, 895	939, 751	----------	1, 156, 646
----	688, 948	218, 259	550, 635	----------	768, 894
----	3, 200, 677	556, 555	2, 837, 588	----------	3, 394, 143
----	983, 656	356, 908	888, 473	----------	1, 245, 381
----	2, 865, 778	528, 667	3, 094, 682	----------	3, 623, 349
----	2, 034, 299	303, 920	2, 181, 681	----------	2, 485, 601

Forest Service, Clark-McNary—Sec. 2, fire control dollar expenditures, fiscal year 1970–71

State and Commonwealth	1970				1971			
	Federal	State and county	Private	Total	Federal	State and county	Private	Total
Alabama	488, 293	1, 106, 993	814, 441	2, 409, 727	473, 336	2, 232, 805		2, 706, 141
Alaska	168, 331	2, 157, 109		2, 325, 440	163, 399	3, 803, 901		3, 967, 300
Arizona	54, 740	41, 245	14, 874	110, 859	44, 470	32, 819	13, 967	91, 256
Arkansas	491, 173	1, 440, 620	53, 327	1, 985, 120	470, 660	1, 290, 832	327, 994	2, 089, 486
California	1, 153, 860	28, 249, 420		29, 403, 280	1, 118, 648	28, 883, 429		30, 002, 077
Colorado	132, 152	702, 247		834, 399	142, 929	1, 618, 530		1, 761, 459
Connecticut	125, 693	303, 825		429, 518	122, 030	371, 671		493, 701
Delaware	14, 370	16, 181		30, 551	27, 661	89, 385		117, 046
Florida	649, 258	6, 362, 131		7, 011, 389	625, 568	6, 342, 223		6, 967, 791
Georgia	682, 862	6, 219, 258		6, 902, 120	662, 026	6, 878, 753		7, 540, 779
Hawaii	62, 493	161, 272		223, 765	56, 712	129, 226		185, 938
Idaho	260, 375	1, 010, 285	130, 875	1, 401, 535	313, 718	904, 020	173, 932	1, 391, 670
Illinois	110, 700	391, 572		502, 272	108, 952	429, 825		538, 777
Indiana	81, 934	213, 580		295, 514	85, 972	275, 979		361, 951
Iowa	64, 474	70, 477		134, 951	62, 021	91, 532		153, 553
Kansas	178, 689	551, 647		730, 336	188, 559	567, 431		755, 990
Kentucky	336, 751	1, 327, 729		1, 664, 480	344, 012	1, 291, 693		1, 635, 705
Louisiana	544, 186	2, 792, 703	22, 015	3, 358, 904	544, 372	3, 283, 337	17, 608	3, 845, 317
Maine	451, 754	1, 633, 719		2, 085, 473	441, 332	1, 841, 519		2, 282, 851
Maryland	193, 361	956, 891		1, 150, 252	216, 895	939, 751		1, 156, 646
Massachusetts	225, 129	463, 819		688, 948	218, 259	550, 635		768, 894
Michigan	575, 303	2, 625, 374		3, 200, 677	556, 555	2, 837, 588		3, 394, 143
Minnesota	368, 172	615, 484		983, 656	356, 908	888, 473		1, 245, 381
Mississippi	545, 309	2, 320, 469		2, 865, 778	528, 667	3, 094, 682		3, 623, 349
Missouri	414, 283	1, 620, 016		2, 034, 299	303, 920	2, 181, 681		2, 485, 601

Montana	191, 076	345, 810	210, 188	747, 074	181, 758	539, 312	94, 413	815, 483
Nebraska	136, 706	471, 386	40, 687	648, 779	146, 980	525, 228		672, 208
Nevada	146, 310	510, 241		656, 551	169, 930	610, 539		780, 469
New Hampshire	121, 524	259, 013	6, 931	387, 468	118, 817	333, 663		452, 480
New Jersey	209, 624	816, 347		1, 025, 971	229, 266	983, 612		1, 212, 878
New Mexico	82, 415	100, 991	19, 749	203, 155	84, 915	167, 279	18, 249	270, 443
New York	438, 656	1, 815, 455		2, 254, 111	442, 061	2, 552, 327		2, 994, 388
North Carolina	576, 121	3, 487, 214	48, 899	4, 112, 234	564, 763	3, 752, 413	48, 818	4, 365, 994
North Dakota	13, 964	13, 964		27, 928	15, 035	15, 036		30, 071
Ohio	172, 814	735, 553		908, 367	185, 291	641, 664		826, 955
Oklahoma	207, 768	432, 446	18, 586	658, 800	213, 518	664, 517	5, 570	883, 605
Oregon	590, 955	3, 160, 875	273, 894	4, 025, 724	581, 458	3, 487, 845	503, 775	4, 573, 078
Pennsylvania	421, 587	2, 298, 939		2, 720, 526	408, 403	2, 171, 926		2, 580, 329
Puerto Rico								
Rhode Island	59, 803	183, 003		242, 806	66, 658	250, 797		317, 455
South Carolina	482, 662	2, 675, 645		3, 158, 307	498, 143	2, 699, 095		3, 197, 238
South Dakota	60, 648	123, 634		184, 282	70, 842	97, 613	43, 776	212, 231
Tennessee	511, 313	2, 979, 161	2, 700	3, 493, 174	511, 472	3, 025, 225		3, 536, 697
Texas	395, 168	1, 292, 675	135, 778	1, 823, 621	383, 112	1, 326, 279	135, 931	1, 845, 322
Utah	107, 229	356, 000		463, 229	122, 373	345, 420		467, 793
Vermont	70, 780	76, 832		147, 612	68, 694	163, 355		232, 049
Virginia	475, 453	1, 848, 933	22, 757	2, 347, 143	474, 669	2, 022, 759		2, 497, 428
Washington	606, 705	4, 454, 317		5, 061, 022	587, 785	5, 487, 348		6, 075, 133
West Virginia	216, 701	664, 150		880, 851	212, 086	665, 411		877, 497
Wisconsin	500, 160	2, 649, 179		3, 149, 339	506, 829	3, 030, 359		3, 537, 188
Wyoming	78, 104	186, 969		265, 073	97, 503	277, 132		374, 635
Servicewide	[1] 1, 192, 109			[1] 1, 192, 109				
Total or average	16, 440, 000	95, 292, 798	1, 815, 701	113, 548, 499	15, 119, 942	106, 687, 874	1, 384, 033	123, 191, 849

[1] Federal administration, inspection, prevention, and special services to States.

Planting stock available for forest and windbarrier planting, fiscal years 1970 and 1971; area planted or

FOREST SERVICE,

State and Commonwealth	Planting stock shipped, fiscal year 1970			
	Federal nurseries	State nurseries	Other	Total
	Thousands	*Thousands*	*Thousands*	*Thousands*
Alabama	0	61, 426	13, 032	74, 458
Alaska	0	0	0	0
Arizona	0	0	0	0
Arkansas	0	24, 764	0	24, 764
California	18, 076	3, 756	367	22, 199
Colorado	5, 978	1, 132	0	7, 110
Connecticut	0	1, 337	0	1, 337
Delaware	0	1, 068	0	1, 068
Florida	0	67, 207	36, 410	103, 617
Georgia	0	48, 197	58, 723	106, 920
Hawaii	0	1, 032	0	1, 032
Idaho	22, 086	745	0	22, 831
Illinois	0	6, 418	0	6, 418
Indiana	0	5, 075	0	5, 075
Iowa	0	567	0	567
Kansas	0	0	15	15
Kentucky	0	6, 147	2, 736	8, 883
Louisiana	0	34, 915	8, 435	43, 350
Maine	0	1, 740	0	1, 740
Maryland	0	6, 330	0	6, 330
Massachusetts	0	225	0	225
Michigan	8, 314	3, 654	3, 018	14, 986
Minnesota	5, 316	14, 647	0	19, 963
Mississippi	13, 807	56, 355	0	70, 162
Missouri	0	7, 811	0	7, 811
Montana	0	1, 229	331	1, 560
Nebraska	1, 891	0	0	1, 891
Nevada	0	90	0	90
New Hampshire	0	1, 088	0	1, 088
New Jersey	0	676	0	676
New Mexico	0	0	0	0
New York	0	15, 072	0	15, 072
North Carolina	0	49, 243	10, 564	59, 807
North Dakota	0	940	3, 600	4, 540
Ohio	0	11, 201	0	11, 201
Oklahoma	0	1, 109	0	1, 109
Oregon	3, 569	15, 087	7, 846	26, 502
Pennsylvania	0	13, 232	0	13, 232
Puerto Rico	0	809	0	809
Rhode Island	0	0	0	0
South Carolina	0	31, 186	11, 226	42, 412
South Dakota	0	1, 097	0	1, 097
Tennessee	0	14, 928	8, 434	23, 362
Texas	0	10, 833	0	10, 833
Utah	0	86	70	156
Vermont	0	598	0	598
Virgin Islands	0	0	0	0
Virginia	0	45, 808	10, 997	56, 805
Washington	18, 299	12, 104	12, 359	42, 762
West Virginia	0	8, 308	0	8, 308
Wisconsin	0	17, 730	1, 850	19, 580
Wyoming	0	0	0	0
Nationwide	97, 336	607, 002	180, 670	894, 351

seeded on Federal, State, and private lands, fiscal years 1970 and 1971; and total acreage planted since 1926
USDA

Area planted or seeded fiscal year 1970	Planting stock shipped, fiscal year 1971				Area planted or seeded fiscal year 1971	Grand total forest and windbarrier plantings since 1926
	Federal nurseries	State nurseries	Other	Total		
Acres	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Acres*	*Acres*
145,080	0	72, 989	9, 823	82, 812	161, 304	2, 149, 667
0	0	0	0	0	49	5, 166
3, 403	0	0	0	0	2, 186	30, 052
39, 989	0	13, 973	0	13, 973	38, 162	661, 737
56, 626	15, 826	4, 359	331	20, 516	55, 075	614, 228
9, 352	3, 926	1, 256	0	5, 182	8, 210	196, 804
1, 364	0	1, 450	0	1, 450	2, 040	64, 978
1, 211	0	370	0	370	400	16, 013
160, 745	0	63, 604	54, 926	118, 530	177, 489	3, 197, 844
85, 898	0	52, 717	62, 918	115, 635	102, 817	3, 004, 201
2, 579	0	634	0	634	1, 310	130, 425
37, 694	22, 928	783	0	23, 716	42, 599	403, 176
5, 154	0	6, 429	0	6, 429	6, 348	233, 222
7, 990	0	4, 928	0	4, 928	11, 145	239, 374
2, 123	0	922	0	922	2, 085	101, 567
2, 578	0	0	25	25	4, 093	269, 976
16, 490	0	7, 362	3, 635	10, 997	22, 526	311, 589
127, 232	0	46, 838	12, 195	59, 033	98, 895	2, 024, 186
1, 867	0	2, 284	0	2, 284	2, 174	70, 975
6, 693	0	6, 436	0	6, 436	8, 411	136, 669
1, 103	0	0	0	0	29	113, 104
13, 173	7, 130	5, 253	0	12, 383	44, 626	1, 742, 174
32, 377	6, 460	14, 426	0	20, 886	35, 665	912, 191
102, 585	24, 373	63, 002	0	87, 375	107, 092	2, 122, 297
11, 936	0	6, 942	200	7, 142	12, 556	264, 026
19, 136	0	1, 389	343	1, 732	27, 197	255, 253
4, 503	1, 889	0	0	1, 889	5, 696	442, 598
209	0	106	0	106	344	7, 433
1, 872	0	1, 161	0	1, 161	642	63, 142
1, 262	0	556	0	556	860	62, 005
535	0	0	0	0	1, 539	47, 274
15, 440	0	15, 441	0	15, 441	15, 763	1, 357, 559
81, 767	0	44, 866	10, 302	55, 168	97, 040	1, 187, 523
2, 826	0	899	5, 676	6, 575	3, 206	238, 226
20, 474	0	15, 605	0	15, 605	22, 853	474, 668
1, 839	0	1, 554	0	1, 554	3, 028	160, 329
162, 375	3, 022	21, 561	11, 186	35, 769	147, 203	2, 342, 189
40, 665	0	12, 670	0	12, 670	40, 699	1, 176, 441
560	0	664	0	664	566	107, 218
223	0	0	45	45	211	37, 884
45, 449	0	31, 940	10, 347	42, 287	69, 842	1, 673, 157
5, 595	0	1, 100	0	1, 100	5, 453	283, 453
18, 086	0	16, 318	23, 236	39, 554	20, 347	834, 700
48, 424	0	11, 857	0	10, 857	54, 655	872, 838
1, 673	0	230	0	230	1, 897	29, 800
667	0	650	0	650	651	83, 373
13	0	5	0	5	13	47
68, 705	0	41, 121	9, 960	51, 081	71, 888	934, 927
135, 659	13, 166	19, 749	28, 113	61, 028	107, 372	1, 434, 694
15, 704	0	9, 036	0	9, 036	18, 190	205, 839
26, 562	0	17, 589	1, 500	19, 089	25, 285	1, 247, 598
4, 354	0	0	0	0	3, 213	49, 946
1, 599, 819	98, 720	643, 029	244, 761	986, 510	1, 692, 939	34, 625, 755

Funds and quantity of forest and windbarrier planting stock distributed under sec. 4, Clarke-McNary Act

FOREST SERVICE, USDA

State and Commonwealth	Fiscal year 1970			Number of trees distributed
	Federal allotment	State appropriation	Receipts	
Alabama	$2, 400	$82, 191	$265, 421	56, 742, 000
Arkansas	2, 400	31, 948	130, 006	22, 200, 000
California	3, 800	26, 582	98, 170	3, 750, 000
Colorado	5, 783	8, 244	61, 684	478, 000
Connecticut	2, 000	28, 601	35, 051	958, 000
Delaware	2, 000	27, 913	(2)	1, 068, 000
Florida	(1)	(1)	(1)	(1)
Georgia	2, 300	98, 734	304, 148	45, 675, 000
Hawaii	3, 000	119, 517	1, 854	1, 026, 000
Idaho	12, 000	24, 986	24, 104	1, 012, 000
Illinois	2, 000	176, 226	81, 176	4, 104, 000
Indiana	2, 000	67, 845	101, 846	4, 884, 000
Iowa	(1)	(1)	(1)	(1)
Kansas	12, 000	58, 665	49, 030	719, 000
Kentucky	2, 400	217, 037	64, 568	5, 798, 000
Louisiana	2, 300	31, 767	159, 277	32, 858, 000
Maine	2, 000	63, 790	48, 377	1, 138, 000
Maryland	2, 000	70, 780	21, 822	6, 330, 000
Massachusetts	2, 000	12, 769	5, 835	225, 000
Michigan	2, 000	17, 476	95, 519	3, 654, 000
Minnesota	2, 000	248, 230	204, 458	14, 647, 000
Mississippi	2, 400	128, 629	278, 666	55, 399, 000
Missouri	2, 000	199, 985	81, 176	4, 494, 000
Montana	12, 000	16, 617	35, 740	1, 267, 000
Nebraska	6, 800	48, 522	132, 819	1, 607, 000
Nevada	12, 000	27, 407	13, 034	116, 000
New Hampshire	2, 000	9, 699	28, 250	786, 000
New Jersey	2, 000	23, 641	9, 265	856, 000
New Mexico	12, 000	17, 202	6, 040	146, 000
New York	2, 000	130, 208	122, 470	14, 892, 000
North Carolina	2, 300	133, 677	356, 610	49, 946, 000
North Dakota	10, 163	10, 163	38, 331	784, 000
Ohio	2, 000	469, 077	127, 026	11, 382, 000
Oklahoma	8, 400	40, 262	9, 836	1, 118, 000
Oregon	2, 500	16, 728	303, 266	17, 149, 000
Pennsylvania	2, 000	297, 348	78, 500	12, 456, 000
Puerto Rico	3, 000	56, 795	(2)	809, 000
Rhode Island	2, 000	3, 686	2, 979	187, 000
South Carolina	2, 400	127, 587	113, 440	24, 125, 000
South Dakota	12, 000	38, 678	12, 407	1, 143, 000
Tennessee	2, 400	47, 016	51, 311	11, 483, 000
Texas	2, 400	58, 669	87, 384	13, 255, 000
Utah	12, 000	14, 599	6, 752	106, 000
Vermont	2, 000	50, 706	16, 764	574, 000
Virginia	1, 900	181, 563	157, 053	39, 705, 000
Washington	(1)	(1)	(1)	(1)
West Virginia	2, 000	169, 849	95, 271	6, 017, 000
Wisconsin	2, 000	295, 733	370, 278	17, 677, 000
Wyoming	3, 356	3, 356	12, 740	185, 000
Virgin Islands	3, 000	16, 307	(2)	11, 000
Total	197, 402	4, 047, 010	4, 299, 754	494, 941, 000

[1] No C–M 4 funding. [2] Trees distributed free.

Funds and quantity of forest and windbarrier planting stock distributed under sec. 4, Clarke-McNary Act

FOREST SERVICE, USDA

State	Fiscal year 1971			Total trees distributed
	Federal allotment	State appropriation	Receipts	
Colorado	$4, 577	$9, 154	$59, 268	528, 000
Guam	800	815		
Hawaii	2, 500	84, 603	878	610, 000
Idaho	11, 812	11, 812	[1]	812, 000
Kansas	12, 000	53, 162	78, 738	982, 000
Maryland	5, 750	106, 414	26, 436	6, 436, 000
Michigan	3, 000	140, 165	93, 297	5, 265, 000
Montana	12, 000	32, 656	[1]	1, 391, 000
Nebraska	8, 000	17, 674	184, 738	1, 647, 000
Nevada	12, 000	26, 312	15, 945	154, 000
New Mexico	12, 000	20, 030	7, 207	143, 000
New York	4, 000	89, 381	[1]	15, 154, 000
North Carolina	6, 000	200, 505	327, 618	47, 836, 000
North Dakota	12, 000	54, 090	[1]	772, 000
Ohio	8, 000	516, 011	168, 879	13, 996, 000
Oklahoma	9, 000	37, 097	12, 512	1, 539, 000
Pennsylvania	7, 500	27, 712	[1]	11, 973, 000
Rhode Island	2, 000	10, 808	4, 352	133, 000
South Dakota	12, 000	37, 276	13, 596	1, 150, 000
Texas	5, 000	97, 621	81, 775	12, 510, 000
Utah	12, 000	13, 712	6, 751	270, 000
Wyoming	3, 247	3, 247	13, 574	182, 000
Total	165, 186	1, 590, 257	1, 095, 566	175, 252, 000

[1] Information not available.

National Forest and cooperative pest control accomplishments, fiscal years 1970 and 1971

OAK WILT CONTROL

Ownership or management	Area surveyed—acres		Trees treated—number	
	1970	1971	1970	1971
National Forest: Monongahela (W. Va.)	1, 600, 000	1, 518, 000	136	93
State and private:				
North Carolina	1, 931, 000	2, 000, 000	39	0
Pennsylvania	6, 900, 000	11, 000, 000	1, 808	2, 916
Virginia	2, 674, 800	2, 457, 000	86	49
West Virginia	21, 162, 970	20, 466, 750	3, 365	2, 466
Total	34, 358, 770	37, 441, 750	5, 434	5, 524

INSECT CONTROL

Ownership or management	Bark beetles		Defoliators		Other insects			
	Trees treated—number		Area treated—acres		Area treated—acres		Trees treated—number	
	1970	1971	1970	1971	1970	1971	1970	1971
National Forest	299, 430	240, 399	1, 703	8, 148	5, 440	934	1, 800	78, 412
State and private	81, 635	211, 924	227, 045	346, 136	0	0	74	864
Nationwide	381, 065	452, 323	228, 748	354, 284	5, 440	934	1, 874	79, 276

WHITE PINE BLISTER RUST AND DWARF MISTLETOE CONTROL

Ownership or management	Blister Rust						Dwarf Mistletoe			
	Surveyed—acres		Treated—acres		Ribes eradicated—number		Surveyed—acres		Treated—acres	
	1970	1971	1970	1971	1970	1971	1970	1971	1970	1971
National Forest	73, 424	19, 887	4, 862	1, 179	8, 940	2, 785	563, 491	263, 376	14, 927	26, 655
State and private	1, 435, 494	1, 160, 695	35, 610	36, 082	851, 518	588, 269	3, 000	0	1, 365	1, 048
Nationwide	1, 508, 918	1, 180, 582	40, 472	37, 261	860, 458	591, 054	566, 491	263, 376	16, 292	27, 703

Texas. "Integrated Management Study." (Second year.) Development of a 30-year integrated management plan for Texas forest resources to meet future raw material requirements of forest industry. The plan will include a comprehensive summary of forest practice needs to achieve maximum resource production. (State contribution $26,500.)

Louisiana. "Forestry Work Crews." (Second year.) A forestry aide program to provide services for a fee to landowners in timber marking, tree planting, TSI, and prescribed burning. The aides will be State-employed and work out of a district office. An objective is to make the project self-sustaining. (State contribution $3,200.)

Virginia. "Private Contract Crews." (Second year.) A technician in each of 3 district offices has been employed to develop and train private contract forestry crews and help to schedule their work. (State contribution $8,500.)

Virginia. "TSI Study." (Second year.) An intensified hardwood TSI project including demonstration areas to increase current timber production and develop work opportunities. Results will be analyzed and evaluated. This project will supplement the private contract crews project. (State contribution $3,000.)

New Hampshire, New Jersey, Montana, Florida, Virginia, and Louisiana. "Rural Planning and Development." (Second year.) Provides for a specialist on the State forester's staff to deal with State planning agency, labor, education, economic development, and other State and Federal agencies and private organizations. Purpose is to maximize use of forest resources in all aspects of State and local planning and development. (State contributions are approximately 20 percent additional.)

Tennessee. "Cookeville Area FPU Specialist." (One year.) An FPU specialist will be employed in north-central Tennessee to provide services in a major center for small forest industries and to support a pilot TDO program (Appalachian Forest Improvement Association). If the program is successful, the State will continue and enlarge the FPR program. (State contribution $6,000.)

Pennsylvania. "Roundwood Marketing." (Second year.) To develop markets for smaller size classes of timber in certain areas of Pennsylvania particularly where high-grading and excessive logging wastes have been a problem. (State contribution $7,850.)

Ohio and Michigan. "Plantation Harvesting and Utilization." (Second year.) To develop needed information on volumes available in price plantations by kind of product and locate markets for material that should be removed in intermediate commercial thinnings. (State contributions will approximate 25 percent additional.)

Wisconsin. "Statewide Landowners Association." (First year.) To organize a statewide landowners association with county or area chapters. Ultimate aims are to provide chapters with timber agents (similar to New York TDO approach). (State contribution $5,275.)

California and Nevada. Lake Tahoe Basin Planning and Development. (Second year.) Forestry planning specialists are being employed by each State to work with the California-Nevada Lake Tahoe Regional Planning Compact and other agencies, organizations, and individuals to help guide and shape future development and to prevent destruction of the environment. (State contribution—20 percent additional.)

California. "Comprehensive Planning Seminars." (Second year.) A series of seminars in rural development, community planning and coordinated land use planning to be conducted by University of California at Davis. The seminars will be attended by Forest Service, State forestry, and local government people.

Wyoming. "Forest Resource Planning." (Two years.) Development of a forest resource plan for Wyoming forest and forest-range lands to meet future raw material requirements of industry and ranchers. The plan will include a comprehensive summary of needs to relieve maximum resource production commensurate with environmental protection.

Colorado. "Mountain Suburban Forestry." (Two years.) Provides intensified on-the-ground service to landowners and local governments for increased forest management, development of special forest products, improved tree vigor, and improved protection on small mountain subdivision ownerships.

Kansas. "Rural Town Forestry Assistance." (Two years.) Allows for the development of comprehensive community forestry programs for 10 towns of less than 15,000 population. The programs will include an analysis of the trees and associated woody plants which are so vital to the environment of these Kansas communities. Action plans will be prepared for each town which will serve as guidelines for other rural communities to follow in developing and implementing community forestry programs.

Arizona. "Resource Analysis and Action Plan." (Two years.) To analyze the private and State woodland areas for their potential for supporting new and expanded rural wood-based industries. Fire protection and forest management needs will also be determined to insure an adequate and continuous supply of forest products.

Idaho. "Location and Identity of Private Forest Lands." (One year.) Provides for the location and analysis of privately-owned forested lands in eastern Idaho and the identification of the forest landowners. With this basic information, the State forestry agency can conduct a more meaningful woodland forestry program.

Utah. "State and Private Forest Resources." (One year.) To conduct a preliminary evaluation of the potential forest uses of the State and privately-owned forest resources within the State.

Hawaii. "State Multiple Use Plan." (One year.) To develop a statewide forest-land use plan that will provide a basis for effective management of the State's forest resources for multiple benefits.

Oregon. "Urban Forestry, Portland Area." (One year.) In cooperation with the college of Forestry at Oregon State, an analysis of feasibility and need for an urban forestry project in the city of Portland will be made.

An action plan will then be developed to insure that the wooded tracts, shade trees, and shrubs be established and maintained in both the old and the newly developed areas of the urban sprawl.

Washington. "Hardwood Marketing Analysis." (One year.) To analyze the present and potential market for hardwoods on a statewide basis. This will include an analysis of the resources available through a study of ownership, accessibility, and local environmental conditions.

Georgia (third year), South Carolina (one and one-half years), Wisconsin (one and one-half years), Oregon (one and one-half years), Connecticut[1] (two years), and Alabama[1] (two years). "Forestry Planning and Development" to demonstrate the value of providing comprehensive technical forestry assistance to sub-State, multicounty planning and development districts, by a forester planner specialist on the staff of the State forester. Employees' duties include establishing liaison with and providing forestry and forest industrial input to the plans and programs of the multicounty districts.

Maryland. "Delmarva Timber Salvage." (One year.) Operation of a program for the purpose of accelerating the harvest, storage, and utilization of beetle-killed and threatened Southern pine timber in the Delmarva Peninsula of Delaware, Maryland, and Virginia. This project has been completed.

West Virginia. "Utilization and Marketing Specialist." (First year.) Provides for the employment of a forester on the State forester staff to analyze and determine the need for forest products utilization services to loggers and processors and to develop a plan of action for such a program in the State.

Missouri. "Urban and Community Forestry." (Two years.) To conduct a program to strengthen the States' urban and community forestry programs by providing black staff experts to aid field implementation of these forestry services to communities throughout the State to improve local environments, preserve, and enhance open space and increase recreation, natural beauty, and the quality of life.

Tuskegee Institute, Alabama. "Minority Landowner Study." (Two years.) A study being conducted in northern Florida and southern Georgia and Alabama to determine the size and number of forest tracts owned by minority residents and their knowledge of and use of public forestry programs. The study will also be directed toward encouraging the use of such services by minority landowners.

Illinois. "Collection of Forestry Input Data." (One year.) Provides for the employment of a forester by the State forester to obtain forestry input data for the eight-county area of northeastern Illinois. The data will be incorporated into a National Resource Information System that is being developed by the northeastern Illinois Natural Resource Service Center, Inc. through the aid of a Ford Foundation grant.

North Carolina. "Wood Utilization." (Two years.) A statewide utilization program to obtain more complete and efficient use of the State's forest resource, especially in the development of new markets for merchantable, low-grade wood material.

Indiana. "Lumber Grading Course." (Four months.) Provides training in lumber grading to industry personnel by private consultant.

Rhode Island. "Produce Timber Type Maps." (Six months.) Preparation of timber type maps for private forest lands.

[1] Funds transferred from Farmers Home Administration for planning support.

Land utilization projects

(ADMINISTERED BY THE FOREST SERVICE)

The following tabulation summarizes the action taken to meet the Secretary's objectives for LU lands.

Status of land utilization projects transferred to the Forest Service or placed under its custody as of June 30, 1969:

Item	*Thousand acres 1969*	*Thousand acres 1971*
Assignment to the Forest Service:		
Transferred to Forest Service prior to January 2, 1954	1, 062	1, 062
Transferred to Forest Service on January 2, 1954	6, 958	6, 958
Placed under the Forest Service custody	827	827
Total assigned to the Forest Service	8, 847	8, 847
Disposals to other agencies and parties:		
Transferred to the Bureau of Land Management	2, 187	2, 187
Transferred to other Federal agencies	57	57
Granted to State, county, and city agencies	806	806
Sold to State agencies	190	190
Exchanged for lands within National Forests or research areas	102	104
Placed in trust for Pueblo Indians	78	78
Reconveyances and sales to former owners and other private parties	2	2
Other (land exchanges, unclassified)	14	14
Total disposals	3, 436	[1] 3, 438
Retained for permanent administration by the Forest Service:		
National Forests	1, 460	1, 460
National Grasslands	3, 802	3, 808
Total retained for permanent administration by the Forest Service	5, 262	5, 268
Balance retained pending determination of disposition	149	153
Total retained		[1] 5, 421

[1] Because of unequal area land exchanges and status corrections, area figures do not balance.

Source: Agriculture Economic Report No. 85, "The Land Utilization Program 1934 to 1964"; and the Forest Service File 1380 (5400), "National Forest System Areas as of June 30, 1964"; and same report as of June 30, 1969.

Receipts and expenditures for National Forest System, fiscal year 1970

FOREST SERVICE, USDA

Receipts from sale or use of National Forest System resources:

Timber	$283, 890, 849
Grazing	3, 771, 965
Other	9, 991, 544
Total [1]	297, 654, 358

[1] This total includes $9,884,508 received from national forest revested Oregon and California railroad grant lands and $2,048,848 received from National Grasslands and land utilization areas administered under title III of the Farm Tenant Act.

Operating expenses for National Forest programs, National Grasslands, and land utilization projects amounted to $298,721,799. Depreciation of roads, trails, and other improvements was estimated at $77,230,536.

Receipts and all other earnings exceeded operating expenditures and other charges by $55,140,322.

By law, the Service retains 10 percent of receipts from National Forest resources for development of National Forest roads and trails except on revested Oregon and California railroad grant lands. The amount retained in this fund in fiscal year 1970 was $31,206,198; and $28,761,091 in fiscal year 1971.

Other amounts received:

Contributed by cooperators and timber purchasers for cooperative work on National Forest programs	$8, 507, 915
Set aside for timber sale area improvements	26, 754, 203
Set aside for brush disposal	12, 776, 558
Miscellaneous receipts	2, 425, 188
Restoration of forest lands and improvements	28, 461
Sale of 130,478 Federal recreation area entrance permits [1]	913, 349
Sale of surplus properties [1]	59, 990

[1] These receipts are available for appropriation by the Congress to the land and water conservation fund.

Receipts and Expenditures for National Forest System, fiscal year 1971

FOREST SERVICE, USDA

Receipts from the sale or use of National Forest System resources amounted to $234,100,609 in Fiscal Year 1971 (period ending June 30, 1971). These receipts came from the following major sources:

Timber	$217, 010, 210
Mineral leases and permits	5, 413, 945
Grazing	4, 774, 468
Recreation—admission and user fee	5, 738, 115
Other	1, 163, 871
Total	* 234, 100, 609

*This total includes $7,403,799 received from National Forest revested Oregon and California railroad grant lands. An additional $2,088,440 was received from National Grasslands and land utilization areas administered under title III of the Farm Tenant Act.

Other amounts received not listed above included $8,762,818 contributed by cooperators and timber purchasers for cooperative work on National Forest programs: $27,726,150 set aside for timber sale area improvements; $13,479,110 set aside for brush disposal; $1,412,010 from miscellaneous receipts; and $11,452 for restoration of forest lands and improvements.

Not included in the above receipts are $2,384,639 from the sale of 1,697,436 Federal recreation area entrance permits and $42,774 from the sale of surplus properties. These receipts are available for appropriation by the Congress to the land and water conservation fund.

Direct receipts and deposits from all sources of national forest programs totaled $287,580,588. In addition, timber purchasers built roads valued at $49,440,953 incident to timber harvest.

Other Federal agencies collected approximately $33,052,575 for power licenses, mineral leases, and permits on National Forest land of public domain origin.

Operating expenses for National Forest programs, National Grasslands and land utilization projects amounted to $377,421,175. Depreciation of roads, trails, and other improvements was estimated at $83,524,804.

Operating expenditures and other charges exceeded receipts and all other earnings by $90,872,863.

Fiscal year receipts decreased $63,514,159 compared with fiscal year 1970, mainly due to decrease in timber sale receipts. Expenditures for fighting wildfires exceeded the 5-year average by $53,728,791.

Expenditures for other Forest Service activities included $33,718,809 for cooperative State and private forestry programs, and $50,070,080 for forestry research. The Forest Service also received $124,309 in royalties from the Smokey Bear forest fire prevention program.

Under the Act of May 23, 1908, as amended, the Forest Service pays one-quarter of National Forest net receipts to States for support of schools and roads in counties containing National Forest lands. This payment in fiscal year 1971 (based on fiscal year 1970 receipts) was $71,896,615. Arizona and New Mexico school funds also received $84,338 under provisions of the Act of June 20, 1910. Under the Act of June 22, 1948, Minnesota received $258,006. In fiscal year 1972 (based on fiscal year 1971 receipts) the payments under the Act of May 23, 1908, amounted to $56,648,064. Arizona and New Mexico school funds also received $69,316 under provisions of the Act of June 20, 1910. Under the Act of June 22, 1948, Minnesota received $259,038.

By law, the Service retains 10 percent of receipts from National Forest resources for development of National Forest roads and trails, except on revested Oregon and California railroad grant lands. The amount retained in this fund in fiscal year 1971 was $28,761,091; and $22,661,542 in fiscal year 1972.

Counties containing National Grasslands and land utilization areas received $511,935 for schools and roads from calendar year 1970 receipts under the Act of July 22, 1937. Payment to counties for such purposes from calendar year 1971 receipts will be $529,502.